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ABSTRACT

This publication is one in a series of case studies dealing with educational innovation in various western European countries and the United States. This particular report discusses educational innovation in the United States. Because of the great number and diversity of recent innovations in American schools, the authors concentrate mainly on discussing different types of innovations, rather than examining specific innovations in detail. In addition, the authors discuss the process of innovation in the United States, sources of pressure for innovation, and the need for educational research and researchers. (JG)

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Technical Report

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INNOVATION IN EDUCATION

- UNITED STATES -

by

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PREFACE

The following case study is one in a series of five dealing with innovation in education. All the studies are descriptive in nature and, as the work of five different authors writing in their personal capacity, they represent five quite individual syntheses and interpretations of vast amounts of information. Yet the confusion that might be expected from this method does not result. What emerges from these studies is instead a reasonably coherent statement of educational responses to the post-war demands of many more people for more and better education.

Perhaps it is not remarkable that the demands have been exerted so consistently on such a variety of nations, nor that the response to them has for the most part been so quick and positive. The nations examined in this book are remarkably similar in that all have a long and honourable tradition of public education, an industrialised economy and a high standard of living. At first glance it even appears that their solutions to the problems posed by recent educational demands are unusually similar: structural reform, curricular reform, compensatory and/or individualised learning systems - examples of each are easy to find in any setting. Yet a closer reading of the five case studies reveals wide and interesting variations: in priorities, in perceived solutions, in strategies evolved or developed to implement them.

Such variety of course reflects to a large extent differences in 'national climate', that peculiar combination of values, objectives, aims and administrative tradition which, aside from language, makes a nation distinctive. The explication of these differences is thus a hidden theme of the five case studies taken as a whole, and an understanding of this hidden theme is necessary to illuminate the more obvious themes of change and growth.

An explanation of this point can be found by comparing, even superficially, Scandinavian countries such as Norway and Sweden on the one hand and the United States of America on the other. At least from the viewpoint of the outside observer, Norway and Sweden have much in common. Both relatively small in terms of population, they can also claim a remarkably unified social and value structure. Furthermore, their style - if such a generalisation can be made - seems to be to have a clear idea of goals and then to set about methodically reaching them. This process is aided by the existence of strong central governments which are able to plan and to legislate with a reasonably clear assurance that what they propose will be achieved. Thus there exists in Norway the National Council for Innovation in Education whose mandate it is to make reality of reform laws passed by the central Parliament. The Parliament, concerned in recent years with "large questions of the role of schools in Society", and sure enough of its constituency, has concerned itself largely with structural reform and new curricula - on a national scale.

The situation in the United States is quite different, even if the question of relative size of total population is ignored. The American federal government is based on a system of checks and balances so fine that it is often hard to determine either the source of impetus or its ultimate manifestation. The situation is further complicated by the well-protected existence of states' rights - particularly the control of education - and, once the issue of taxation is raised, by municipal and regional claims as well. Perhaps more important, the rich diversity of the American population inevitably means conflicting social and ethnic interests, values, and views of national priorities. The past decade of American life has indeed been one of fast-changing goals and objectives and of massive social upheaval. Much of the upheaval has connected itself to education and made demands accordingly: in the light of this political and social background, it is not surprising that American education responded by producing such a variety of innovations in every area and at every level that the final array can be quite bewildering, whilst at the same time providing a vast reservoir of experience for others.

England and the Federal Republic of Germany likewise provide differences quite distinctly their own. Writing of her own country's approach to recent educational change, the author of the English case study notes

> " ... the English style is distinctive. You can seize on it instantly. There is no acceptance of common objectives, except in the most general sense which inspired the last major education act: the need to widen opportunities and eliminate the poverty both of individual children and of the public provision of education.(1) There is no national plan for education, no law which specifies where development is necessary as in some OECD countries. There is almost no theory. The point is characteristically made in a recent major report on education (2): 'We invited the help of a number of distinguished educationists and professors of educational philosophy ... They all confirmed the view that general statements of aims were of limited value and that a pragmatic approach to education was likely to be more fruitful.'"

The reference to "two decades of non-reform" in German education, a phrase coined by Professor S.B. Robinsohn, is slowly becoming eroded, especially during the last two years, which have been marked by fundamental changes in many parts of the school system. With increasing co-operation between the Länder and with the initiatives of the new Ministry for Education and Science, the need for a more systematic approach to educational reform, and especially to educational experimentation, seems more important in Germany today than in many other countries.

Despite these differences in background and style, the five country studies do show one overriding problem in common: the need to change and improve their educational systems. Furthermore, as their experience increases, they all face the reality that explicit measures to facilitate the management of educational change are necessary, that innovation and improvement cannot be haphazardly left to chance.

"Rapid advance in education research, development and actual instructional innovation will be impossible until a pattern of order and effective co-operation is established among school districts, state school offices, universities and federal funding agencies. Although many excellent things are now being done, a survey of the nation as a whole would show a discouraging lack of systematic effort and a waste of time, energy, and resources."

Committee for Economic Development, 1968.

"... fundamentally the public schools have not changed to meet this rapidly changing society. This is particularly true of public school systems in large cities. I say this with full knowledge of the many, many innovative devices, procedures and concepts which have been introduced into the public schools of large cities by forward-looking and dedicated staff members. But I repeat, the general pattern of the public school has not changed to meet a vastly changing society."

Bernard Donovan, Superintendent of Schools, New York City, 1967.

"The changes reported by California school districts indicate that a revolution is taking place, characterized by increased specialization of assignment of teachers, the development of specific instructional programs for groups of students with identifiable special characteristics, and applications of new technology."

Donald Johnson, Administrative Consultant, Bureau of National Defense, Education Act Administration, Department of Education, State of California, 1963.

I. SOURCES OF PRESSURE FOR INNOVATION

Educational innovation is only a small part of educational change - that part which consists of technical or social inventions deliberately implemented. Rapid educational change in the United States during the last two decades has brought strong pressures for innovation. There has been an accelerating democratization of higher schooling. High school graduation, formerly the privilege of a minority, has become the prerogative of the majority and the norm as well, so that those who do not complete high school are now stigmatized as "dropouts".* They are supposedly unemployable in a post-industrial occupational structure which has an increasing proportion of professional, technical and white collar jobs and declining proportion of blue collar jobs.**

The fastest growing part of the educational hierarchy in the United States, however, has been the colleges and universities. Elementary and secondary education, which absorbed the postwar baby boom, increased their enrolments by 37 per cent during 1955-65, while enrolments in higher education doubled in the same decade. Over half of all high school graduates now go on to college. As a result, the demand for academic preparation in high school has sharply increased. This enlarged demand for college-preparatory courses and pressure for academic up-grading led to the famous curricular innovations of the fifties and sixties in the high schools. Intense competition for college entry put the universities into a position of great influence over the high school curriculum. Academic high school texts, which were written by professors of education in the heyday of the mass terminal high school, are being rewritten by eminent university professors in the new

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* "If we look at fifth grade cohorts from 1920 through the present, and if we plot the dropout rate for each year, we obtain a rather smooth curve that shows a decline from about 80 per cent high school withdrawal in 1920 to about 40 per cent in 1960 ... voluntary withdrawal has declined from about 70 per cent in 1920 to about 25 per cent in 1960".(1)

** " ... there is an evident occupational handicap involved in dropping out, but the handicap of ... being nonwhite is far greater. About 12 per cent of the white dropouts were unemployed among those who had a few years to secure work; but nearly 18 per cent of nonwhite graduates in the same age group remained unemployed". Ibid.,p.8. Saleem & Miller also found in Syracuse that high school graduation made a difference in the employment prospects of middle class students but not in those of working class students. This suggests that even when they are high school graduates, students from working class homes look for blue collar jobs, and that high school graduation is not relevant to obtaining these.(2)

age of mass college preparation. The new academic high school curricula, more advanced than those they replace, have been introduced mainly into upper-middle class suburban high schools which send their talented graduates to prestige colleges. Toward the other end of the academic talent continuum, high schools which must "hold" and make suitable provision for the youngsters least adept at school work are in difficulty. Little innovative energy has been directed to their problems.

The democratization of schooling is also a facet of our traumatic national struggle to incorporate American Negroes into an urban, industrial class structure with its characteristic pattern of upward mobility. The old southern agricultural economy based on the Negroes' cheap labour has disappeared. Disappearing along with it is the repressive caste system which kept labour cheap by holding the blacks "in their place" - that is, in a lower caste with no chance to win wealth, honour and power through occupational achievement. Part and parcel of the caste system was the denial to Negroes of an education in any way comparable to the public education offered to whites.

With the rural South no longer offering them a livelihood, Negroes have been migrating from country to city, and from the South to the North and West. Only a little over 50 per cent of United States Negroes now live in the South. They are distributed between rural and metropolitan regions like the white population, but within metropolitan regions they are far more concentrated in the central cities than are whites. This is especially true of the largest metropolitan regions.

While de facto residential segregation of the races is strong, de facto racial segregation of the schools is stronger still. The population of elementary school age is more heavily Negro than the population as a whole. In addition, many whites in central cities attend non-public schools. Seven out of ten of the largest metropolitan regions have central cities with public elementary school populations which are more than 50 per cent nonwhite and more cities are moving in that direction. Edward J. Logue, former Director of the Boston Redevelopment Authority, has predicted that Boston, whose elementary school population is at present 30 per cent nonwhite, will have reached the 50 per cent mark in five years. Repeatedly in Boston, schools which were sited so that they would be racially balanced under Massachusetts law when planned (i.e. no more than 50 per cent nonwhite) were racially imbalanced by the time they were opened a few years later. There is an element of social class segregation involved which is equally important. Among 16- and 17-year olds, 14 per cent of the white middle class and 14 per cent of the white working class now attend non-public schools; 40 per cent of the Negro middle class and 1 per cent of the Negro working class attend non-public schools. These figures do not differentiate between city and suburbs. Whites accomplish most of their social class segregation by migrating to suburbs where they attend public schools, with a homogeneously upper middle class clientele.

As a result of these trends, the public schools of the central cities are becoming heavily populated with working-class and lower-class nonwhites. This de facto resegregation has completely overwhelmed de jure desegregation. In New York City in 1954 the Negro and Puerto Rican population was 29 per cent of the elementary school population. In 1964 they were 50.5 per cent of the total ... While the number of segregated schools (defined in New York City as more than 90 per cent Negro and Puerto Rican)

in 1954 was 7.1 per cent of the schools, by 1964 they were 25.3 per cent. The per cent of segregated elementary school buildings more than tripled while the nonwhite elementary population slightly less than doubled.(3) The school population in Washington, D.C. is 91 per cent Negro. Of eleven high schools in the District examined in a study by A. Harry Passow, one was 93 per cent white, one 60 per cent black and the rest between 84 per cent and 100 per cent black.(4) As of 1966, almost 80 per cent of all white pupils in the first and twelfth grades in the United States as a whole attended schools from 90 to 100 per cent white, and 99 per cent attended schools at grade 12 that were 50 per cent or more white. More than 65 per cent of all Negro pupils in the first grade attended schools that were between 90 and 100 per cent Negro. And 87 per cent at grade 1, and 66 per cent at grade 12, attended schools that were 50 per cent or more Negro. In the South most students attend schools that are 100 per cent white or Negro.(5)

The same forces which have presented the central city public schools with a clientele deriving from the educationally weakest homes in the nation have eroded the tax base from which they draw their funds. The gap between central city and suburban financial resources for education is growing wider at the very time when cities need a relative strengthening of their schools, and at the very time when the demand on them for educational "output" is intensifying. This is not true for New York City which spends $1,000 per pupil - more than some suburbs. But it is true for the nation as a whole. For a sample of 35 large metropolitan area suburbs in 1963 the per pupil expenditure was $559.42 in the suburbs as compared to $414.46 in the cities. In 1957 expenditures per pupil were approximately the same for cities and suburbs.(6)

Inner city public schools are now expected to teach all of their pupils to read. Anything less is defined as intolerable failure although - retrospective mythology to the contrary notwithstanding - the public schools systems of the cities in the 1910s and 20s did not teach all of the children of immigrants to read. It mattered less then, since the elementary school dropouts of that era could find unskilled jobs which were acceptable to them.

The gap between rising academic demands and declining results in the central city public schools is a major source of pressure for innovation. The pressure was increased by the report on Equality of Educational Opportunity(7) (the Coleman report), published in July, 1966, which documented the failure of schools to overcome differences in academically relevant skills that white and Negro children bring from home to their first grade classrooms. The initial differences were predictable, given the deficient educational heritage of millions of Negroes who have migrated to city school systems from the rural South. Generations of under-education do not produce parents able to train their pre-school children to the levels of mastery in spoken language, perceptual discrimination, and role-playing which well-educated parents automatically expect and almost unintentionally teach.

The failures of elementary schools to close the cognitive gap generated by vastly different homes in the first five years of life is not new; but due to the Coleman report it is newly recognized. There is now an almost desperate search for innovations to help overcome these gaps.

Finally, the drift toward nationalization of all American institutions, and increasing federal as opposed to local government power, have affected education dramatically during the past fifteen years. For one thing, there has been an explosion of federal funds for education. In 1950 the United States Office of Education (U.S.O.E.) had a staff of about 300 and a budget of $40 million. In that year it was charged with administering a programme of grants to school districts where military bases and other federal installations were located. In 1953, education received more prominence in the federal government through the establishment of the Department of Health, Education and Welfare. In 1954 the Cooperative Research Act was passed. Under this act U.S.O.E. funded research in education on the basis of proposals initiated by academic and other professional researchers. In 1957, the National Defense Education Act gave U.S.O.E. control over vast grants to secondary and higher institutions to increase the production of scientists, engineers, and language specialists. (This was the response to Sputnik.) By 1962, U.S.O.E. had 1,400 employees and an annual budget of $600 million. In 1963-64, it became the administrator of the Vocational Education Act and the Higher Education Facilities Act. Title IV of the Civil Rights Act of 1964 gave the Office of Education the power to assist by advice and money in the desegregation of schools; Title VI of the same law was an injunction against federal grants to school districts which practiced segregation. In 1965, the Congress passed the Elementary and Secondary Education Act (E.S.E.A.). Title I of this law granted federal funds to school districts where a large proportion of families were below the "poverty line". Title II of E.S.E.A. authorized a five year programme of grants to states for acquisition of library resources and other instructional materials. Title III provided for "supplementary education centers and services"; it was intended to finance the development of innovative projects. Title V of E.S.E.A. provided a small sum for strengthening state departments of education. Under the E.S.E.A. the U.S.O.E. solicited and financed proposals for ten Research and Development Centers and, in addition, a network of "regional laboratories" for the development and dissemination of educational innovations.

This is only a small part of the picture of drift toward federal influence in education. The Department of Defense and the Veterans' Administration combined spend more on education than does U.S.O.E. In addition, the National Science Foundation, the National Aeronautics and Space Administration, the Department of Agriculture, the Department of Labor, the Department of Commerce, the Office of Economic Opportunity, the National Institutes of Health, the Public Health Service, the Atomic Energy Commission, and the Office of Vocational Rehabilitation are federal agencies which spend significant amounts on education. In 1962 total federal expenditures in this field were somewhere between $2.2 billion and $3.5 billion depending on whose estimates are used.

Some degree of national uniformity in education is made necessary by the geographic mobility of the American people. Regions with low birth rates and high school expenditures suffer when they must cope with the immigration of families from regions of high birth rates and low school expenditures.

Most of the non-governmental agencies which influence the contents of curriculum and standards of performance are national in scope. The big textbook publishing firms produce for a national market. The well-known testing agencies have developed achievement and aptitude tests which are used across the country. Local school systems judge their pupils against

the test norms which are derived from national samples. Regional accrediting agencies set minimum standards of course offerings, faculty quality, library holdings, and physical facilities which private secondary schools and colleges feel compelled to meet. The national professional associations of educators and unions of teachers are a force for uniformity in qualifications and working conditions of schoolmen.

The most recent expression of this trend is the work of the Committee on Assessing the Progress of Education. With funds from foundations and U.S.O.E., the committee is conducting a national survey of what school children at every grade level have learned.(8) The plan was resisted by officials who dislike the possibility of invidious comparisons. To meet their objections, the assessment, like the Coleman survey, will report its findings according to such characteristics of pupils as the regions where they reside, type of community, age and sex; but it will not identify school systems. Nevertheless it will contribute to more explicit and influential national standards of school achievement. Groups and areas which are lagging behind the national average will be under pressure to catch up - and this will provide another thrust toward innovation.

An impending change in the control structure of public education is the possible break up of the largest school bureaucracies in the biggest central cities. These bureaucracies have been acused of failure to change to meet the needs of their changing pupil clientele. They are called excessively large and rigid. They are encumbered with numerous internal veto powers which make it easy to stop any initiative but exceedingly difficult to carry through a positive programme of change. A number of alternatives to the single school system with a monopoly on public education in the city have been suggested. The Bundy report (cf. Mayor's Advisory Panel, Reconnection for Learning (3) proposed decentralization of the New York City public schools: in effect division of the city into a number of smaller, semi-autonomous school districts. The U.S.O.E. is promoting "community participation" in school decision-making through Title I and Title III of E.S.E.A. Opinion leaders have proposed university-controlled schools; state-run schools; vocational high schools run by private corporations under contract to the state; government tuition grants to parents combined with a system of competing independent schools, and various combinations of these.

Although attention is focussed on the central cities because they are in a state of crisis, it should be noted that there exists no good assessment of the impact of innovative forces on rural areas, smaller cities, and the affluent metropolitan suburbs. Lower middle class and blue collar suburbs have educational problems very similar to those of the central cities. The last have the finest public school systems in the country, responsive to powerful community demand for "the best" in education for their children. They have probably been more receptive to innovation than any other group of public schools, and they have needed it least.

Innovations can be classified for convenience into three types: (1) innovations in the organizational structure of school systems and schools; (2) curricular innovations; and (3) technological innovations. Most important by far are the organizational innovations. Changes in curriculum and the introduction of new technology always require

accompanying organizational changes, but the fact is sometimes not recognized. When it is not, innovations in schools which have not been restructured to accommodate them are resisted, eroded, and finally abandoned.

II. TYPES OF INNOVATION

Organisational Change

1. Desegregation. Under the United States Constitution, control of education is reserved to the states. The famous Supreme Court decision of 1954, Brown v. Board of Education, held that state laws requiring white and Negro children to attend separate schools were unconstitutional. The decision overthrew the earlier doctrine of Plessy v. Ferguson (1896) that "separate but equal" public facilities for the two races were permissible. Brown was not a sudden reversal of doctrine but the culmination of many decisions dating back to 1938 in which the Court had been moving gradually closer to the position that public facilities racially segregated by law were inherently unequal.

In the 15 years since Brown many court decisions and some federal and state laws have clarified and elaborated upon the doctrine. The Civil Rights Act of 1964 gave the Department of Health, Education and Welfare (H.E.W.) the power to assist school districts which asked for help in desegregating and the right to cut off federal funds from districts which did not desegregate by a certain date; but for political reasons H.E.W. has used these powers very gingerly. One or two states, for instance, Massachusetts, have outlawed de facto segregation, but the Massachusetts law has not been enforced. The law was passed with the votes of legislators from communities with virtually no Negro population. State legislators from the three cities of Massachusetts which have large Negro populations - Boston, Springfield, and New Bedford - did not support it.

In the southern states where de jure segregation was the rule, there has been a counterpoint of state plans to evade the law, followed by court decisions declaring the evasive plans unconstitutional, followed in turn by still more ingenious evasion and delay.

There is a small bright side to the generally dark picture. Few, if any, middle-to-large-sized cities in the country are now without some kind of desegregation or integration plan, however effective, and in whatever stage of implementation. Most of these are fairly straightforward attempts to comply with civil rights legislation, but there are some that are going beyond legal injunction to the point where they might have some effect on education.

Berkeley, California, a city of 120,000 surrounding the main campus of the University of California, desegregated its public schools partly by bussing not just out of the slums, but in both directions. White children in grades four to six go from Berkeley's middle-and-upper-class neighbourhoods in the wooded hills near the university to schools in the flatland Negro sections near the bay. The younger Negro children are bussed out for Kindergarten and third grade classes in the white areas.(9) In Boston, over a thousand self-selected Negro children

are bussed to schools in the suburbs from the city's black ghetto; the plan is federally financed. Hartford, Connecticut, has a similar plan.

When all this is said, the concrete results of Brown have been small and slow in coming. As a result of massive Negro migration to the North, where blacks live in segregated neighbourhoods, de facto school segregation has increased since 1954. It is against this background of the failure of desegregation to be implemented that black militant demands for self-segregation by choice must be understood.

2. Decentralization. New York City has 900 schools with a staff of 60,000 teachers. A 1966 study of decision-making in the school system concluded that power is highly concentrated in a group of about 30 headquarters officials who have low public visibility. The Board of Education has the appearance but not the reality of power. Because it is without a permanent staff, the Board's policy decisions to desegregate New York City's schools by means of careful site selections for new school buildings, school pairing, bussing and other means were effectively delayed by headquarters staff, who alone had the expertise to implement them. Eventually an articulate opposition group of white parents was mobilized and the Board of Education simply did not carry out its pledges.(10)

Site selections can be made so as to try to guarantee a racially mixed catchment area. School pairing means taking two schools relatively near to each other, one predominantly white and the other predominantly black, and putting all of the children of certain grades, say K through 3, into one of them, and all the older children into the other. The school bus is a well-known American institution used to transport rural children to distant schools. It is now used to bus Negro children to school in the suburbs or on occasion to other sections of the city. What is significantly called "reverse bussing" means bussing white children out of their neighbourhoods to schools elsewhere, usually into less affluent neighbourhoods. The spectre of "reverse bussing" is almost always enough to arouse fierce opposition in the white community. It has often been used as a red flag to prevent any desegregation plans from gaining support.

A serious difficulty of the New York City school system is that it receives an unjustly small share of state aid. This is true of most urban school systems and has to do with rural over-representation in United States state legislatures. Under the New York State formula, the city would receive more state aid for education if the five boroughs had separate school systems. The formula depends on calculations of land values which constitute the community's tax base. Manhattan land values are so high as to put the city as a whole at a disadvantage. If The Bronx, Richmond, Queens and Brooklyn were treated separately, the city would receive $100 million more in state aid under the present formula.

It was this fact which first led New York City to seek to decentralize its school system. Without reviewing the entire history of the question here, the state ordered Mayor Lindsay to have a panel study the question and present a plan for decentralization. The Mayor's Advisory Panel, headed by McGeorge Bundy, issued a report on 9th November, 1967 detailing a decentralization plan. At the same time the Ford

Foundation, also headed by Bundy, gave funds to three local school boards - two of them in black communities - to strengthen their activities.

The so-called Bundy plan and Mayor Lindsay's proposals for radical decentralization of the school system were opposed by the Board of Education and the United Federation of Teachers (U.F.T.). The U.F.T. believed its contractual gains from the city would be endangered if decentralization compelled it to negotiate contracts with newly-constituted school boards. For similar reasons, the teachers' unions in most large cities have a vested interest in retaining the present centralized control structure. The New York U.F.T. also believed that the interim decentralization plan - under which the Ford-funded districts were functioning - did not adequately protect the job security of teachers in those districts. The districts felt just as strongly that the plan fell far short of the total "community control" they wanted. During the school year 1968-69 the union and the districts were locked in intense conflict over alleged violations by the districts of teachers' rights. The city suffered three teachers' strikes. School was closed almost continuously from September to mid-November. Tension between the predominantly white, and Jewish, union and the black districts spilled over to spread ethnic tension throughout the city. In late spring the state legislature passed a decentralization law much weaker than the Bundy proposals, and one under which the three "Ford" districts would be abolished. It was a clear victory for the union. In the meantime, however, education in the city had several times been brought to the brink of chaos, not only by the strikes, but by student-organised disruptions in many high schools. The events accelerated the movement of the middle-class - both black and white - out of the public schools.

3. Community Control. A more extreme substitute for the big city school system than decentralized districts is community control of the schools. This means breaking up the existing bureaucracy into smaller school systems based on residential communities which, by implication, are ethnically homogeneous. The system would be subject only to state law, free of any city-wide controls, and would be run with active participation of the laity.

To a large extent the community control movement grows out of the black power demand for black control of all ghetto institutions. It also draws on experience with the Johnson war on poverty which provided for "maximum feasible participation" of the poor in administration of federal anti-poverty funds in their neighbourhoods. The Economic Opportunity Act created hundreds of organisations in inner-city neighbourhoods under the "maximum feasible participation" provision, giving experience in organising in dealing with government, and in the uses of political pressure to thousands of previously inexperienced men and women. Many in the community control movement are veterans of the anti-poverty war.

Community control is strongest in New York City where it is tied to black power. In Boston that tie is less exclusive. There, a more muted movement has been set in motion partly by Title I and Title III funds. Under Title III, community groups have been formed by an office of the Boston School Department to help plan innovative new schools for their areas. Title III has also financed a parent-teacher school

advisory group in the black community. Once formed, the groups do not remain docilely within the bounds envisioned by their sponsors. They press for movement from advisory to policy-making status. This pattern is repeated in many American cities.

From a European perspective, lay participation in control of the schools is precisely an American distinction, so that community control may seem less of an innovation than an extension of existing arrangements. From an American perspective, community control of the schools is part of a larger social movement toward revival of the small community - anti-bureaucratic, dedicated to curing the alienation generated by a society of gigantic organisations. At the same time, community control would vest new power over their schools in urban neighbourhoods.

Although broad political and social motivations and narrower educational ones are intermingled in the movement, the political goals are dominant. Furthermore, the argument that community control would improve education rests on rather weak grounds. For one thing, it is a segregationist position of a new kind. The black communities want to staff their schools with black teachers and administrators who, they claim, would instil pride and a sense of power in the children, thereby improving their academic performance. The fact that the segregated black schools of the South were usually staffed by blacks has no relevance, since self-segregation by choice is psychologically at the opposite pole from imposed segregation.

The argument has plausibility but there is no firm evidence for or against it. Part of the difficulty in predicting outcomes arises from the fact that one cannot substitute equivalently qualified black teachers for whites. Coleman reported that, on the average, the blacks now licensed to teach, or in training as teachers, have verbal abilities and academic backgrounds inferior to the average of white teachers.(11) Whether they would have more favourable attitudes toward black pupils and these would more than compensate for academic deficiencies, no one can say. Middle class black teachers do not always have favourable attitudes toward lower class black pupils.

In white ethnic minority neighbourhoods, community control is sometimes an old-style anti-black segregationism in thin disguise. Where desegregation could only occur by transporting children out of their communities to school, community control negates this possibility. The liberal instigators of community control are often discomforted to find some of their supporters believe it will rescue their childrem from the necessity of attending even high school with black students. Ironically echoing the black militants, white ethnic groups talk of the need for their own community high schools to preserve their cultural identity.

One argument for the educational benefits of community control is that parental involvement in the school improves childrens' academic motivation. There is empirical evidence for this belief. What is not clear, however, is whether community-based small school systems can sustain parental participation any better than large school systems. Once the excitement of the movement is past, there is little reason to believe that the level of parental involvement would be much greater than it is now.

4. The Community School. Related to the ideas of decentralization and parent participation but somewhat distinct is the concept of the "community school". This school is supposed to serve not only children, but all members of the community on a 14-hour-a-day, six-days-a-week, year-round basis. The school building or complex of buildings is conceived as housing many services in addition to schooling. They include recreational facilities, meeting facilities, cultural facilities and social, informational and health services. In Boston, urban renewal plans for residential and commercial building are closely tied to plans for community schools. For instance, a planned Secondary Education Complex for 5,000 students, to be located in the Negro neighbourhood of Roxbury, includes commercial services such as movie theatres and restaurants and some housing for faculty. The planned new Quincy Elementary School building also includes commercial and community services as well as private apartments.

This kind of planned environment is intended to encourage the flow of daily activity in close proximity to the school and to make the use of the school building by adults in the community both convenient and natural. In this way, it is hoped that the isolation of the school from the community will be overcome and community participation in school decision-making encouraged.

However, in many cases there seems to be no clear idea whether what is wanted is a school with deep ties to its local neighbourhood, or a school which will draw both its pupils and participating adults from throughout the city and beyond. The Secondary Education Complex in Boston, for instance, is called a "magnet school". One of its aims is to have a pupil composition which will be representative of the entire city, socio-economically and racially. If that is to be the case, the school will have to draw pupils from beyond the local neighbourhood. Its "community" cannot be the neighbourhood but must be the total group of families it serves. In Massachusetts, the community school idea is complicated by the state's Racial Imbalance Law which requires that no school be more than 50 per cent nonwhite. In very many cases that would mean that pupils must be drawn from outside the local neighbourhood. How this kind of recruitment meshes with the idea of local participation in decision-making is not clear. The almost contradictory combination of the "community school" with the "magnet school" overlooks the fact that some working-class and ethnic groups form genuine neighbourhood communities. While this might facilitate identification with a community school, it is not compatible with amiable acceptance of outsiders. Already the parent planning group of one new school in Boston's black ghetto has protested the reservation of places in the school for white students from outside the neighbourhood.

5. School-University coalitions. The City University of New York has suggested that its College of Education should run an elementary school in Harlem both as a training ground for teachers and an exemplary school. The proposal has not been implemented. Such a plan was carried out by the Adams and Morgan Elementary Schools in the District of Columbia and the Antioch College-Putney Graduate School of Education. The Antioch-appointed Director of that project published an article detailing its difficulties which ended in Antioch's withdrawal. The project staff provided by Antioch was inexperienced in elementary school organisation and curriculum and was hampered by time pressure.(12)

In the Boston Metropolitan Area - though planning documents speak glowingly of drawing on the resources of the great universities - these private universities have so far contributed relatively little to inner city school innovation. Traditionally, the Boston schools draw their teaching staff from the state colleges and a small group of Catholic colleges. The private universities' schools of education have supplied teachers for the suburbs. While every one of the private universities is involved in one or more of Boston's innovative projects, these projects, usually federally financed, are generally underfunded, and understaffed, and like the Antioch project, suffer from lack of experience of the university personnel with inner city schools. The orientation of these schools of education has been, until recently, almost exclusively to the children of the middle classes. The teachers they train and the instructional innovations they purvey have worked in the suburbs but have had little testing in the ghettos. It is not at all clear that a simple transfer of suburban styles of instruction to the ghetto will serve. The teacher training institutions have a good deal of experimenting to do before they will know how to make ghetto schools excellent. There is also the financial problem to be solved. Suburban school systems not only offer teachers the pleasant prospect of "success" with children who are destined to be educationally successful anyway, they pay more as well, and so attract the superior teachers. Reversing this trend is largely a question of salaries but also involves creating an atmosphere of professional challenge for teachers in city schools. The leading teacher-training institutions would seem best able to create an atmosphere of this sort on a demonstration basis. Yet there are few instances so far where they have done it.

6. Education of "Hard-Core Unemployables" by Private Industry. There are numerous efforts of this kind, most of them funded by the federal government and encouraged by the National Alliance of Businessmen. (Some large companies, for instance General Motors, finance their programmes themselves). In general the companies find that training "hardcore unemployables" (men from poverty groups) costs $2,500 to $3,000 per person, much more than the usual on-the-job training costs. In addition to remedial arithmetic and English, most of the companies find they must train the men in "work habits" - like arriving on time, and not being frequently absent. Sometimes people fail to report for the job because, not being able to read, they can't find which bus to take. "Chrysler found ... only one in five owned an alarm clock, because they had never needed to be any place at any particular time".(13) (For a good account of the reasons for absence of "work habits" among lower class Negro men, see Liebow.(12)) Companies have varied in their reports of success. Chrysler reported more success than it had hoped for, Equitable Life, much less. Success seems to depend on acceptance of the fact that the investment must be high, training groups must be small, the amount of special counselling and help in overcoming educational deficiences must be large, and there must be a guaranteed prospect of a good job with a future if the trainee is going to stick with a course of study which is very difficult for him.

7. Team Teaching, Non-Grading, Flexible Scheduling. In a series of books published by the Indiana University Press, each of the three above-mentioned innovations is described as a "bold new venture". They

are, nonetheless, a logical extension of the well-known trends of progressive education and are very much in the non-authoritarian child-raising tradition. They are treated together here because in practice they are linked. A school may begin by non-grading without inaugurating team teaching, but the process involves a collaboration among teachers which is quite different from what follows from the "self-enclosed classroom". In effect, it is a kind of team teaching. Similarly team teaching may be the first innovation, but usually its objective is to facilitate "individualized instruction" the major form of which is non-grading.

One might use the spatial organisation of the non-graded school as a way of describing its characteristics. If it is a secondary school, it may accommodate as many as 5,000 students, but it is explicitly structured to have the advantages of both large-scale and small-scale organisation. A five-thousand-student high school is likely to be divided into houses of about 1,250 students each, and each house is further subdivided into "resource units" including 250 students, 15 teachers, and five other staff members. Each house has its own master and considerable autonomy. Ideally, students identify with their houses and it is hoped that they have a personal relationship with every member of their resource unit. Architecturally, the resource unit ("pod") is the basic building block of the school. It consists of a number of rooms with movable walls grouped around a center which contains curricular materials, teachers' offices, individual carrels (perhaps equipped with television sets or computer consoles) and areas for small group work. The center also contains a library of books, film loops, video tapes, audio-tapes and records. The resource units themselves are grouped around some central administrative facilities of the House and possibly a larger library used by the House as a whole, and the Houses, in turn, are grouped around a few major facilities used by the school as a whole: its administrative center; its data-processing center; its health center; its major cultural-recreational center with auditoriums, swimming pools and gymnasiums. The classrooms in the resource unit can be changed in size for either small or large-group instruction because the walls are movable. Some critics feel this is undesirable and that the school should have rooms designed exclusively for large group instruction, where all electronic equipment is at fingertip control of the teacher; rooms designed exclusively for small seminars; and multi-purpose rooms where small groups and individuals can simultaneously use self-instructional materials and pursue independent study projects.

The school is on a flexible schedule usually known as a modular schedule. It divides time up into modules of thirty minutes which can be combined into longer periods as desired. The teaching team decides on various time combinations for different units of instruction. A given level of social studies may meet in a large group once a week for an hour; in small discussion groups twice for 30 minutes; and then have an hour of scheduled independent study. The school may cycle its schedule every week or every six days or every three days, or in any way that seems desirable. It is the computer that makes this flexibility possible. Given the prescriptions of the faculty for time schedules of courses, the course elections of the students, and the spaces available, the computer matches people, space and time optimally and expeditiously.

"IndiFlexS (Individualized Flexible Scheduling) calls for teaching teams ... the small and large groups with independent study patterns can

be used without team teaching, but the advantages of team teaching to both students and teachers make its use judicious. Teams of teachers can be organized in a variety of ways ... all teachers of one subject area who teach the same course may be members of a team. An alternate method ... is by blocks of students. In this method teachers of several disciplines who have a common group of students are on a team".(15)

Still another kind of team differentiation is a hierarchy of skill and authority. A teaching team is made up of a Team Leader who is a master teacher and a trainer of teachers, a few Associate Teachers, a few teaching interns, and several para-professionals who do secretarial work, help with discipline and housekeeping, and possibly with some teaching and student counselling. In some cases it has been proposed that the para-professionals should be on a ladder toward a professional degree involving more practical and less academic work than the typical education degree. This is meant to speed up the professional qualification of Negroes who are found, in the field, to have the capacity to teach although they may not have the academic certifications. Attached to the team, too, will be educational specialists, like reading consultants, and guidance counsellors, in effect the whole array of staff types now available to schools plus some new ones, e.g. computer programming specialists.

The hierarchical aspect of the team is emphasized in recent proposals for change in teacher preparation (Massachussetts Advisory Council on Education.(16)) The teaching career is to be made more attractive by giving it several promotional steps, in contrast to the present situation where a teacher is usually on probation for a few years and then receives tenure. Once tenure is received no increase in prestige or responsibility is possible without leaving teaching for an administrative post. The new teaching career would have stages: student teacher; teaching intern; associate teacher; master teacher and team leader. There would also be options for many kinds of educational specialties. It would be possible for a teacher to gain increases in pay, prestige and responsibility according to merit while remaining a classroom teacher and trainer of teachers.

The abstract, prescriptive books which have been written about these innovations are not so illuminating as the few case studies which have been published. One such book is an account of the first year of non-grading in an elementary school. Old Bethpage School is in Plainview, Long Island, a community a little above the national median in income, population 33,000, mainly Jewish and Catholic and described by the authors (the principal and vice-principal of the school) as "very supportive of education and innovation." The school had 440 K-3 students who were the candidates for non-grading. They were grouped into 12 reading levels, four of them "reading readiness" levels. Seventeen interage classes were composed, each consisting of pupils covering a range of no more than three adjacent reading levels.(17)

There are several points to be noted here. Old Bethpage is in a traditional school building. There were ostensibly no teaching teams but in effect, there was continuous counsultation among staff teaching the same reading levels. There was homogeneous ability grouping, a way of structuring classes which research has not shown to have any particular merit when practiced in a graded school. Children originally were not grouped by age. A reading level group in a classroom contained

children differing in age by as much as two and a half years. This last feature, however, did not survive the first faculty meeting. The teachers, according to their principal, "panicked" at the thought of no age-grading.

Thirty-one of the 440 youngsters were not grouped by reading level. They had special problems, mainly emotional, and were therefore matched with the teacher whose personality was best suited to handling them.

The mental health aspects of non-grading loom very large in this case study. The teachers learned not to place immature and physically underdeveloped youngsters with bigger, more mature ones, even if they were up to their level academically, because, they said, this was hard on the younger children's egos. On the other hand, the secure, bright youngster did profit from being placed with older children who were academic equals. Although the school used no programmed instruction, it incorporated part of the philosophy of programming: that every child should be placed in such a way that he would nearly always experience academic success and not failure.

After an initial period in which children were shifted a good deal from group to group, the teachers changed their tactics and began "individualizing" instruction.

A very detailed diagnosis of possible sources of reading difficulty was made for all "slow learners". There was careful testing for perceptual problems. Some youngsters had tele-binocular problems. Some had poor eye-hand-co-ordination. Some had poor auditory discrimination. Some had poor left-to-right eye movement. Some had poor small muscle control. Wherever a deficiency was found, a programme was devised to help the child. Each child had administered to him individually, by his teacher, a Reading Inventory to test a variety of subskills which go into reading. Sometimes these identified particular difficulties that needed work: "Irma needed exercises in final consonant sounds, structural elements and vowel sounds. The reading consultant spent an hour a week with her on this and gave the teacher a ... program to use the rest of the week ... Arnold has not been able to learn to read by the phonics approach. A complete experience approach should be tried with him. Short interesting stories should be read to him, and he should dictate these back to the teacher in his own words. The teacher will write them for him to copy. He should then take them home to read and bring them back to class to re-read. The kinesthetic approach should also be used with this child ...".

Every slow learner in the school received a tailormade programme within his level, and all but two succeeded well within their levels by the end of the year.

Mathematics at Old Bethpage was also taught in ten levels. Children were not necessarily on equivalent levels for maths and reading, though nothing is said in the book about their shifting classrooms. Apparently they merely shifted groups within the classroom which suggests, as would be expected, that maths and reading levels were closely correlated.

Another aspect of individualisation in Old Bethpage was pacing. Some children were expected to finish primary school in two years and some were expected to stay for four. Since changes of level occurred all year long, and since the policy was not to let a child who stayed for a fourth year repeat any of the curricular material he had worked with previously, it was felt that the differences in length of time spent at given levels were less conspicuous than non-promotion in the graded school, and therefore less traumatic to the children.

Another development during the course of the year was independent study. "There were corners with specimens, microscopes, books, magnifying glasses, etc., for work on science problems. There were sections of the room set up with paints, clay and crafts materials. Still other centers housed mathematical manipulative materials and play materials for encouraging individual work in mathematics ... It was necessary that children learn how to pursue this type of learning on their own. This problem-solving training took much time and effort on a teacher's part ... We became more and more accustomed to seeing two or three children working ... on some project they had selected from the many the teacher had suggested ... None of the ideas offered to the teachers or by the teachers for independent study ... was earth shatteringly original ... the need for the bright child to work, think, plan and create occasionally on his own part of the time was ... recognized". (Emphases added.)

During the first year, the principals failed to persuade teachers of the need to keep detailed records of children's progress. "The non-graded school requires a very definitive method for the identification and inventorying of a pupil's achievements. It requires a knowledge and specificity about a child which was not somehow necessary under the graded situation. Teachers must know exactly what skills a child has mastered in each curricular area before he can proceed from one sequential level to the next. This implies three prerequisites: the identification of a pupil's achievement at each level; the organization of each curricular area into levels of achievement with appropriate identification of exact skills at each level; a system for recording each pupil's progress within each level." The principals said that in maths and reading they met the first two requirements but not the third.

All of these aspects of the Old Bethpage programme and some others are found in Boston's non-graded primary programme called the Individual Progress Plan (I.P.P.) There exists a list of over 300 separate "language arts" skills in nine areas, sequentially arranged in each area. There are also a short pre- and post-test for every skill, so that teachers can determine when a child has presumably mastered it. Teachers in I.P.P. keep progress charts showing exactly which skills each child has "mastered" and when the test was administered. (Regression in skill mastery occurs.)

An in-service training workshop for new I.P.P. teachers held in the summer of 1968 emphasized that pooling ideas, materials and every other kind of resource is an absolute necessity for survival in I.P.P. So much material is needed by each teacher that none can afford to "hoard" anything in "her" closet for "her" levels. As teachers devise worksheets for skill practice these are placed in a central file. After a few years the school has accumulated a file of worksheets for every skill, tested and shown to work for their pupils.

The sheer amount of local curriculum-writing, and test-creating which the teachers initiating a non-graded programme find it necessary to do is a new aspect of the teacher's role. Despite the new technology for presenting curriculum material, and despite the materials on the market geared to these new machines, teachers do not necessarily find exactly what they need when they need it. Then they create it themselves and reproduce it on the school's copying machine.

The teachers in the non-graded Old Bethpage had some problems with parents. It was hard to "place" one's youngster since he was no longer in a grade. Report cards were abolished. Instead there were parent-teacher conferences during which parents were given detailed information about their child's progress through levels and anecdotal reports concerning his effort - but no information comparing his performance with that of other children. The child was compared only with himself. However, parents reinterpreted every bit of information they received in terms of competitive comparisons with other children. If a youngster was with older children, they immediately assumed he would finish primary in two years. Parents pressured the children to "move up a level", an attitude contradictory to the philosophy of the programme. (The child should move at his own pace.) Nothing is said in the book, unfortunately, about the extent to which the children themselves abandoned the competitive peer comparisons which are usually so much a part of the pupil culture.

Non-grading in high schools means that each student has a programme of his own, perhaps unlike that of any other student. In Ridgewood High School, Illinois, there are no conventional classes. Students learn in large groups of 60-300; in seminars of 12-16 chaired by a student with a teacher present as a "resource person"; and in learning laboratories accommodating 25-45 students, some of whom work individually and some of whom work in groups of 2 to 4 on a curriculum "unit" of a course. When a unit is completed to a student's satisfaction, he goes to a teacher's office to have his work on it evaluated. All evaluations are individual and private. Students keep records of how many curriculum units they have completed. They also keep folders on their papers, projects, and products of all kinds with which they are "satisfied". A file of this sort can be used on graduation by students seeking employment or college admission.

"In Ridgewood High School programmed learning is seen, not as an impersonal, machine-centered process, but as a highly personal learning how-to-learn process. The student, as he learns how to learn, must be taught to plan his work carefully, to define his objectives, to exercise his options, to evaluate his progress and to communicate his experiences to others. The basic organizational unit .., is not the class and not the individual .. It is the small work-group usually of from two to four students who are pursuing a program of instruction together, learning from one another as they do so. The non-graded school of the future will have learning teams as well as teaching teams".(18) (Emphasis added.)

The last statement is supported by the development in Winchester, Massachusetts, of an elementary school based on small group instruction. "Dr. Walter Gleason, assistant superintendent for curriculum and instruction says small groups allow for the 'human processing' and interaction that every kid needs. The socializing and questioning they

provide each other is an important part of the learning process, he maintains. Though the school has facilities for individual programmed instruction, Gleason says he has 'mixed emotions' about restricting children's thought patterns to a set of standard responses. Though there are some advantages in reinforcing children after correct answers, as programmed instruction does, keeping the 'kid' in a booth is not the best,' he says." (Boston Globe, 18th August, page 8-A.)

Not only is non-grading a form of small-group instruction, it usually involves homogeneous ability grouping. This is generally true where levels are used. Occasionally a case appears where the teachers have deliberately arranged their groups to be heterogeneous with respect to ability. So the old question of homogeneous vs. heterogeneous ability grouping reappears in the non-graded school and, having received no solid answers from research, it is resolved according to prevailing preferences.

The levels system seems to be the most common type of non-grading now in use in the United States. In a sense, the levels represent a still more finely subdivided system of grading. There is an underlying assumption that mastery of the subjects which are "non-graded" in this way occurs in a sequence whose order is somehow inherent in the subject and the same for every learner. While the child is permitted to proceed through the sequence at his own pace, he is not permitted to change the order in which material is learned. The sequential steps of skill mastery for reading are in some cases so detailed that the result seems to be more strait-jacketing for pupils and teachers than the looser, annual curriculum prescriptions of the old graded system. The assumption that learning should invariably occur in a certain sequence - an assumption for which there is no warrant in learning theory - is a short-coming also of linear programmes in programmed instruction and of the computer-assisted instruction which employs them.

Whatever structure is used for non-grading, it is clear that it is not, for the most part, individualised instruction but small group instruction. And the nature of the process and the outcomes must depend very heavily on a combination of several factors. First, there is the question of pupil/teacher ratio. At the in-service workshop for the Individual Progress Plan in Boston, the teachers were constantly told that individualisation "depends on you". To tailor a programme of work in "language arts" to the individual needs of each child in a class of 25 would take the teacher 48 hours a day. Presumably the administration of an individualised programme is eased by the availability of so many materials of different kinds which children can work with by themselves. But that introduces another factor. A teacher from a disadvantaged de facto segregated school with I.P.P. reported that the pupils in his school did no work at all if left on their own. They had to be supervised constantly. There is tremendous variation in pupil populations with respect to their capacity for semi-independent work. In some classrooms the teacher can easily give individuals and small groups an assignment to work on, while she spends time with another group, and in other classrooms this may prove very nearly impossible. In general, it is the "disadvantaged" children who are least able to do constructive work independently.

Aside from the problem of availability of personnel, there is the problem of availability of materials. Plenty of materials are being

manufactured. There is a constant flow of new basal readers, of machines which present material in pictures and orally as well as in print, of games which can help children to learn phonics, understand concepts, etc. but there are two important difficulties. Teachers are given little or no paid time to familiarize themselves with the flood of materials on the market, and to discover what they can use to greatest profit with their pupils. Secondly, even when they do know what they would like to have, the central city school system is able to afford only a small fraction of it. The Individual Progress Plan, operating under Title I in Boston, is starved for funds, and therefore for personnel, materials, and paid time during which teachers may plan their pupils' work.

Yet the teachers involved overwhelmingly testify that I.P.P. takes far more time devoted to planning by the teacher than the "self-enclosed classroom" did. That seems self-evident. Whereas previously she had one lesson plan for her class, the "non-graded" teacher must plan for several groups and sometimes for an individual - the more so, the more seriously she tries to adhere to the programme's philosoply. Frequently, she must invent curriculum materials herself.

Non-grading is an innovation which is receiving widespread trial not only in the suburbs but in large cities as well. Of the six city school systems whose innovations were studies by Gittell and Hollander (19) all "have begun to use some non-graded primary organization for grade K-3, but New York and Baltimore are still regarding the program as purely experimental. Philadelphia, since 1961, has non-graded the first three years in all its schools. St. Louis began ungraded primary schools in 1959 and the innovation is now implemented in all its schools. Detroit, which had a kind of departmental system in its early grades, changed to a self-contained class, began a non-graded experiment in 1965, and by 1966, had implemented the non-graded primary in most schools. Chicago began its non-graded experiment under the name Continuous Development Program in 1957; and by 1963, it was in effect in 200 schools with an additional 100 planning to use it the following year. In addition, some of the schools were trying the plan in grades 4-6. Baltimore had ten schools using non-graded 1-3 in 1962, and now has twenty-six schools with some non-graded classes, including several schools which are completely non-graded K-6. New York City has only ten schools with non-graded K-2 although the first experiment started in 1962 with one school." Boston has had ten schools with non-graded primaries for the past two years, and in 1968-69 is adding another ten.

According to Goodlad and Anderson there was, as of 1963, no research evidence anywhere in the country which proved that non-grading raised academic attainments. What little research had been done tended to show that it raised pupil and sometimes teacher morale. However, that finding has appeared in the early phase of every innovation. Unless it persists over a long period, it must be considered a Hawthorne effect. This is a sociologist's term for the rise in morale which occurs simply as the result of the excitement and prestige which frequently accompany taking part in an experiment. It is completely independent of the content of the experimental stimulus. Where the fact that an experiment is in progress cannot be disguised, it is necessary to control for this. Many innovations are not instituted as controlled experiments, however, and Hawthorne effects are not uncommonly taken to be the result of the innovation.

8. Compensatory Education. The concept of "compensatory education" is tied to the concept of "cultural deprivation". There is a familiar body of propositions which relates the two, resting on a large amount of sociological and psychological research. (For a concise summary and annotated bibliography up to 1965, see Bloom, David and Hess.(20))

In brief, educational advantage and disadvantage are transmitted in the first four years of the child's life, via the family. Cognitive growth is more rapid in the first four years than in any subsequent period, and deficiencies in that period are increasingly difficult and expensive to compensate for as the person grows older.

Poor families may not even be providing for the child's biological needs. A child who does not have an adequate diet cannot learn. This extends to the prenatal period when, according to recent research, insufficient protein may damage the growth of the nervous system. Adequate diet is also related to the living habits of poor families - which sometimes prefer non-nutritious to nutritious foods, and which sometimes do not manage to send the child to school having had breakfast because the household is not organised to meet this need.

The child must also have some basic security and self-love to be able to learn. Families which are too large for their incomes, which are broken or disorganised, may not permit individual children to receive the amount of warm attention they need to acquire these character traits. Such families are found in all social classes but poor families are generally larger than better-off families and more vulnerable to being broken by the death or absence of a parent.

Poor families also have the largest proportion of un- or ill-educated parents, who are least able to function as adequate educators of their children during the pre-school years. Children's learning during these years depends on an environment which provides rich stimulation, particularly stimulation to active exploration of the environment.(21) The process of cognitive development is also influenced by possibilities for language development through interaction with adults whose own use of language provides good models for the child and whose communication with the child provides him with a feed-back which permits him to correct and expand his linguistic and conceptual tools.

In the United States, in addition to the fact that a higher proportion of Negroes than whites are poor (although a majority of the poor are white), the Negro child suffers from the consequences of a caste system, not yet eradicated, which subjects him to a string of penalties because he is Negro. The crippling effects of the system are transmitted directly and indirectly to children. In the Coleman report they appear in the much higher frequency of Negro than white children who believe that their own actions have little effect on their "fate". The child's concept of his own ability and his "sense of control of the environment" were - of all the dozens of variables studied in the survey - the ones most strongly correlated with the pupil's academic achievements - although the correlations almost certainly involve these variables acting as both cause and effect of achievement. Of all the characteristics of the school the child attends, the social composition of the pupil population was the one most highly correlated with

individual academic achievement. But no variable characterizing the school proved nearly so strongly correlated with achievement as variables characterizing the child's family and the child's attitudes.

As they enter school, "culturally deprived" pupils often lack behavioural and cognitive abilities which urban teachers take for granted, and consider the responsibility of the home: for instance, the ability to speak in sentences and to understand simple directions in the teacher's "standard English". Lacking these characteristics, the pupils engender an attitude on the part of many teachers that they cannot learn. If teachers hold a poor opinion of the pupils' capacity to perform well, the opinion may affect their teaching in subtle ways which tend to turn their unfavourable expectations into a self-fulfilling prophecy.(22)

Herein lies the heart of the accusation which Negroes level at the public schools. There is, in the ghettos, something which might be called the "slum school truce". In effect the teachers and pupils agree to leave each other alone. The teachers will not bother the students with work so long as the students in turn do not make trouble. These schools are custodial, rather than educational institutions. Some years before the Supreme Court school desegregation decision of 1954, Negro students who had migrated from southern segregated schools to northern desegregated ones reported with some exhilaration that the northern white teachers "made them work" - a new, ego-enhancing experience. Nowadays one reads the same comment being made to contrast new, experimental schools, (for instance, the storefront academies run by the Urban League) with the northern urban public schools in the black ghetto. "Making them work" as opposed to not bothering to do so is only the most obvious way in which teachers' expectations are turned into self-fulfilling prophecies.

The most important attempt to "compensate" for "cultural deprivation" is the early childhood education project, Head Start, which began as part of the Johnson anti-poverty programme under the Office of Economic Opportunity. Head Start is a nursery school programme for pre-schoolers. The quality of the programme and the numbers of children reached have varied from community to community. In some places there has been intensive work on cognitive growth, but most Head Start programmes stress social development using standard nursery school methods. There are a few good evaluations of Head Start's effectiveness which are fairly consistent in their findings. The Coleman report evaluated the effects of participation in Head Start during the summer of 1965 on the performance of children who entered first grade the following autumn. Wolff and Stein evaluated the effects in New York City on children who entered kindergarten in the autumn.(23)

According to Coleman's nationwide survey, Head Start was effective in <u>reaching</u> the children most in need of it. "The highest degree of participation was in regions characterized by low socio-economic status and low test scores ... Overall Project Head Start programs were offered in communities where they were most needed and were attended by pupils ... from more deficient backgrounds than pupils who did not participate." Furthermore, the effects of Head Start were largest for the participants from the most deficient home backgrounds. "Controlling for race, region, kindergarten attendance, and various measures of socio-economic status, it would appear that scores for participants

were consistently higher than scores for non-participants from the same schools for pupils from the poorest families".(24)

Effects on educational motivation were larger than effects on ability test performance. "... we find that Head Start participants from lowest SES backgrounds have a higher educational motivation than non-participants. This is particularly true for Negro pupils from poor families, although this difference tends to appear for all Negro children. For whites, participants from lowest socio-economic backgrounds seemed more motivated than non-participants in some regions, while no effects of Head Start participation could be found for higher SES white pupils".

The greater sensitivity to Head Start exposure of the most deprived pupils was also found by Wolff and Stein. They discovered further that Head Start children with kindergarten teachers rated as "good" gained more in kindergarten than matched non-participants, while those Head Start participants with kindergarten teachers rated as "poor" did less well in kindergarten than non-participants. In general, throughout the Coleman report, the finding is that deprived children's performance is more responsive to the adequacy or inadequacy of their school environments than that of non-deprived children, for whom the more determining environment is the home.

The most recent nationwide evaluation of Head Start, made by Westinghouse Corporation and Ohio University, tested the cognitive ability of Head Start children after a year or two of primary school and found no difference from a matched group of children who had not been in Head Start. Although the study unfortunately had no data which might have illuminated the reasons for this ineffectiveness, it suggested that Head Start might not have been sufficiently intensive, might not have begun sufficiently early in the child's life, and might not have used the best possible methods. Critics of this study have pointed out that it failed to measure the social behaviour and educational motivation which previous studies had shown to be the main areas of Head Start's effectiveness. It also failed to differentiate summer from year round programmes.

The Committee for Economic Development has estimated that an extension of Head Start to 80 per cent of three-to-five year olds in poverty would cost $2.8 billion a year.(25) Compared with the cost of other suggested innovations - instructional television for 75-80 per cent of the elementary and secondary school population would cost $265 million to $1.5 billion; one hour a day of computer-assisted instruction for all elementary and secondary pupils would cost $24 billion - this seems cheap. There remain difficult questions. The effects of Head Start are small - as would be expected from a programme of short duration. The effects do not persist if the child moves from Head Start to an inferior primary school. Since Head Start programmes vary greatly among themselves in philosophy and procedure - it is not clear exactly what is producing the positive effects which have been observed.

In order to produce large and persistent effects, Head Start should begin at age two. It seems to many that a large programme of early preschooling for deprived children, combined with radical upgrading of primary education for these same children is, on the evidence of the research at hand, one of the most productive educational investments the nation could now make. Gains which have been fixed by the end of grade 3 are probably ineradicable.

The other major compensatory education effort in the United States is that administered under Title I of E.S.E.A. through the nation's school systems. Again the nature and quality of the programmes vary and so does their effectiveness. In New York City and in Boston, the tendency of the programmes is to invest in small reductions of pupil/teacher ratios and in more services of the kinds already available. Research has demonstrated, however, that small reductions of class size are unproductive of academic improvement (Project Talent.(26)) Drastic reduction of class size might be productive. (Some of the innovative schools discussed above try to handle this problem by providing small group instruction for part of the time.)

There is no nationwide evaluation of Title I's effectiveness. Various local school systems are trying to evaluate their own programmes. In New York City, however, a very similar programme has been given a competent evaluation. The More Effective Schools were found, after two years, to have produced no significant changes in academic achievement, though they did have favourable effects on teacher morale.(27) This evaluation study has been the subject of sharp controversy. In particular it has been attacked by teachers who originated the programme. As a result, in part apparently of the evaluation, the Board of Education has cut back the programme. Nothing in the evaluation study itself suggested such a move. It was pointed out that two years may be too short a time for effects to show and that some favourable motivational effects on students were present. However, a previous programme of similar nature - Higher Horizons - showed no long-term academic effects after an initial period when high enthusiasm seemed to be producing results - and this experience probably influenced the Board's decision.

Evaluations of compensatory education programmes in other large cities have produced uniformly discouraging results.(28) It seems possible that they are a case of both "too little" and "too late".

The New Curricula

In March, 1956 Jerrold Zacharias, a physicist on the faculty of the Massachusetts Institute of Technology, sent a memorandum to James R. Killian, then President of MIT, proposing the development of some teaching materials for use in secondary school physics. Through Zacharias' efforts there developed a large-scale reform in the physics curriculum of the high schools. The Physical Science Study Committee (PSSC), in pioneering reform in high school physics was the catalyst for a wave of curriculum reform in all the high school academic subjects. Today the new curricula include several well-known programmes: in mathematics; in biology; in chemistry; in English; in foreign languages and in the social sciences. Elementary school science and social studies have also been "reformed", but most of the effort is at the high school level. No academic subject has remained untouched by it.

It was the poor academic preparation of the new mass of postwar college students that convinced many college teachers of the need for upgrading high school academic curricula. The success of Sputnik gave the drive for reform a national urgency.

The new curricula have been most frequently initiated by eminent men at the college level. However, high school teachers have been deeply involved in writing and testing of the new materials. This collaboration of scholars and high school teachers has helped to bridge the gap between the universities and secondary schools.

The development of new programmes has had a level of funding that routine curriculum revision by local school departments never commands. The reformers saw a chance to make a wide and lasting impact on the schools. Most of the funds came from the National Science Foundation and such private groups as the Ford and Sloan Foundations.

The curriculum revolution has not, for the most part, questioned the inclusion or exclusion of certain subjects from the academic course of study in high school. For instance, scientists are not suggesting that a year of geology replace biology. The present pattern of presenting biology in the tenth grade and chemistry and physics in the 11th and 12th grades has been accepted. What has been challenged and changed is the content of the courses.

A common objective of all the projects is to stress the underlying structure of the subject.(29) "The Chemical Bond Approach Project is an attempt to develop an introductory chemistry course which presents modern chemistry to beginning students. The presentation is intended to give students a preliminary understanding of what chemistry is about, rather than simply an encyclopedic collection of chemical reactions and laboratory techniques, or a mere overview of diverse conclusions held by chemists today. Such a course must be an organized one in which the pattern reflects the structure of the discipline itself. Since conceptual schemes play a major role in the organization of chemistry today, the

organisation of the course in chemistry is best based on conceptual schemes".(30) Knowledge in any field is so enormous that no one can possibly master it all. Hopefully, the student who has mastered a few central concepts can relate previous and new learning effectively.

To understand the nature of the scientific method, the student must be actively involved in investigation. The laboratory work of all the new science curricula attempts to replace the kind of cookbook experimentation that characterized much of previous laboratory experience. The idea is for the students to have the chance to "move step by step, from acquiring the necessary skills and preliminary acquaintance with the problem, toward the frontier of knowledge, where they can explore together a bit of the unknown and learn by patience, carefulness and persistence to the point of obstinacy, precision in measurement and accuracy in observation. They can sometimes experience the joy of discovery. They must learn to ask the right question - to frame a testable hypothesis. They must learn to draw valid conclusions from their data and to determine the significance of their findings. They must learn that science frequently advances through the correction of the errors and inadequacies of earlier science. And all of this takes time".(31)

Every significant reform has attempted to bring curriculum up to date. For example, at the time Zacharias and his colleagues examined physics texts being used by high school students, almost all used an exclusively Newtonian frame of reference. While this is appropriate in many instances, it failed to recognize the Einsteinian theories. PSSC uses an Einsteinian frame of reference.

Concurrent with new approaches to curriculum content are explorations into new methods of teaching. The student's exposure to a fairly lengthy experimental laboratory experience was mentioned above. Rather than presenting a subject as if it were an unambiguous, untentative body of "secular theology", there is an effort to make the student aware that the answers scholars have are only approximations and are often ambiguous. Rather than depending on the memorization of "facts", the student is asked to seek (and not always find) answers through his own efforts. He may be given several "particulars" first and asked to work through to the "law" on his own.

To help foster the inductive approach to instruction, the new programmes usually include a wide range of integrated materials. These include a textbook, series of films (PSSC has over 60), inexpensive kits for students to construct such things as their own balances out of soda straws; laboratory and teacher guides; battery of achievement tests; comprehensive series of related paperback books. The materials are all designed by the same people. Each part is designed to be used with every other part to produce a unified learning experience.

The production of such sophisticated educational materials tends to change the role of the teacher in the sense that she is no longer responsible (along with a textbook) for presenting the subject matter. She will more often be guiding the student through the material, presenting him with intriguing problems, enabling him to work through to tentative solutions on his own.

But the need for quality teachers remains. "Serious limitations are imposed upon the student's ability to learn by the instructor's ability to teach. If the student is to be brought to the frontiers of knowledge the teacher must know the whereabouts of these frontiers. If the student is to be encouraged to grope, the teacher must at least be able to suggest which of his roads are likely to be blind alleys".(32)

Teachers need to be retrained to work effectively with the new curricula. Some programmes sponsored by the National Science Foundation have used summer institutes and in-service institutes to reach teachers. Some of the obstacles to teacher re-training will be discussed in the section on Programmed Instruction. While the problem of reaching the 12,000 physics teachers in the United States is a challenge, what about the problem of reaching 1,000,000 elementary school teachers?

Four different means of evaluating the new curricula have been used: (1) observing whether students using the material appear to be progressing successfully; (2) interviewing students and teachers using the programme; (3) testing students, using achievement tests especially designed for the new material; (4) comparative testing of students using "new" and "old" programmes using both traditional and specially designed new tests. The results from the comparative tests seem to be the same from field to field. Students who have been taught by conventional methods do well on conventional-material tests, but often do poorly in tests on the revised material. Students in the new courses do as well as students in conventional courses when the tests do not require the recall of specific terms or facts but demand problem-solving abilities. The sharp difference between the PSSC course and other physics courses has been recognized by the College Entrance Examination Board which has provided separate examinations in physics for PSSC and non-PSSC students.

One of the difficulties of determining just how successfully the "new" curricula come over is that the course objectives are not always clearly defined. "Unfortunately, course goals frequently have a rather mystical quality. What does a student do when he intuitively senses the structure of a field or thinks like a physicist?"(33)

Despite the popularity of the new maths, physics, biology and other curricula with many teachers and students, innovators are less than satisfied with the spread of curriculum changes so far. According to Goodlad (1964) schools using the materials are for the most part in upper-middle class communities rather than rural school districts and lower class urban areas. A somewhat more optimistic picture is painted by Uri Haber-Schaim in the March 1967 Physics Today: "The PSSC course in physics is used in its entirety by more than half the high school students taking physics in the United States." But data released in November 1966 through the National Research Council stated the following: "Enrolments in public high school science by type of course 1964-65

Physics, total	526,200
Traditional physics	384,700
PSSC	99,900
Advanced physics	41,600

For the same time period, the Physical Science Study Committee claimed "5,000 teachers and 200,000 students" using its course. Contributing further to the confusion, Conant, in The Comprehensive High School on

the basis of the questions "Is physics offered? If so, is any type of 'new or advanced' physics available? (For example, PSSC) "concluded: " ... about half of all the schools responding have adopted the new physics, about half the new chemistry, and over a half (64.9 per cent) one of the new biology courses. Thus the evidence is conclusive that those in charge of curriculum development in at least half the schools are alert to innovations and have adopted them". (Emphasis added.)

Shifting focus from the national scene as depicted by statistics to the local scene as depicted by direct observation helps to clarify the source of confusion. It is illuminating to read comments on this subject from a Harvard field study of the Watertown, Massachusetts school system: "Grades 10 through 12 offer traditional courses in biology, physical science, chemistry and physics. Although the newer science texts are used in some courses, these new approaches are offered in name only. Lack of space, equipment, and time forces the science department to teach content-oriented courses rather than to use the laboratory approach recommended in all of the new curriculum materials". (34)

The phenomenon observed is not merely local: " ... observations will show that in the majority of high schools, teachers of science lecture 80 per cent of the class time, and that the laboratory time is given over to 'doing experiments' with equipment laid out in advance; hence, the results are postulated in advance. Yet teachers and administrators will assure the observer that the new curricula (PSSC, CHEMS, BSCS, and the like) are being used and 'inquiry' is the mode of instruction. In the intermediate and junior high school years, the lecture approach is the major mode, although not to the extent found in the high schools. In the primary years (K-3), most 'learning by doing', most 'inquiry' may occur. In the colleges, the lecture is supreme".(35)

The New Educational Technology

1. Programmed Instruction. What are the ingredients of programmed instruction? The subject matter is composed into a sequential presentation which may be in the form of a book, tapes, strips of paper, or slides. The programme is subdivided into a series of items called "frames". A frame is a unit of the programme which requires a student to respond. Material presented in the frames builds up cumulatively in very small steps. The information required to respond to a frame is contained in that frame, or in the preceding frames, or both. In the linear programme an attempt is made to maximize the probability of the student's responding correctly. Errors are considered undesirable.

Programmed Instruction (P.I.) whether by machine or book has as its goal the continuous interaction between the "teacher" and the pupil. Unlike the traditional classroom situation where each pupil is only intermittently in communication with the teacher who can only occasionally "reinforce his correct responses", P.I. sets up a situation where there is continuous immediate reinforcement.

To some extent programmes reflect the learning-theory positions of the programmer. Two divergent approaches have been called by Hebb, the "connectionist" and the "configurationist" theories. The basic controversies between these two positions in psychology have never been resolved.(36)

The connectionist position is response centered. Learning is supposed to occur gradually as the probability of desired responses is increased through repeated instances in which a reinforcement or reward follows the occurrence of the response. Numerous student responses punctuated by frequent reinforcement of the "correct" ones are necessary if permanent learning is to be achieved. A fundamental postulate of the connectionist position is that behaviour is learned only when it is "emitted" and reinforced. From simple units of behaviour, complex responses are assembled by reinforcement in a chain. The kind of response being strengthened and the kind of reinforcement used need not be logically related. All that is necessary for learning to take place is that the student be properly reinforced when the desired behaviour occurs - i.e. when he answers correctly.

The configurationist position focuses on the stimuli in the learning situation rather than on the response. "Stimuli in the organism's environment are perceived in an organized and structured manner; which stimuli and in what organization are dependent upon the characteristics of the stimuli themselves and on the previous experiences of the learner ... Performance is not essential to learning; rather, it is a product of learning in the sense that learning permits goal-directed, problem-solving behavior to occur under the proper motivating conditions. Learning itself occurs when perceived stimuli become related to each other, either spatially, temporally, or conceptually in the form of a symbolic representation ... To insure that the desired learning will

occur, the learner's attention must be directed at the relevant aspects of his environment, and these must be arranged in such a way as to facilitate the formation of new cognitive relationships. Insight and ideation are important determiners of post-learning performance and must therefore be promoted by the instructional process. Most configurationist theorists believe that learning is cognitive and that the outcome may or may not be reflected in later performance independently of the success of learning. Thus, it is what to do, not doing, which is learned and later applied when conditions are appropriate for performance". (37)

The distinction between the connectionist and the configurationist theories is reflected in the preparation of programmed materials. The response-centered programmer, inspired by the connectionist position, will provide many occasions for the desired response and the subsequent reinforcement. In order that the learner may be frequently reinforced, short frames are used with gradually increasing complexity and difficulty of response. Errors should be minimized.

A stimulus-centered programmer, influenced by the configurationist principles, is more concerned that the material to be learned is organized and structured in a logical and familiar context, rather than that the learner be given many opportunities to practice the right answer. He is less likely to present the learner with material fragmented in short steps so that the main ideas are lost and the development of creative insights difficult. This programmer does not feel that wrong answers are unfortunate in that they contribute nothing to the learner's mastery of the subject. Configurationists often employ branching in their programmes - after a student makes an incorrect response, he is directed to a remedial presentation which explains the misunderstood material more fully. Stimulus-centered programmes try to take account of individual differences in learners by employing several different paths in the programme to achieve the same final mastery. Certain frames can be omitted if the student already knows the material. Special material can be included to remedy a student's deficiencies.

Thus response-centered and stimulus-centered programmes are likely to differ in their approaches to response requirements, stimulus content, error control, individual differences and programme organization. At the risk of oversimplification, the response-centered programme can be identified with the linear programme and the stimulus-centered programme with the branching programme.

In assessing the merits of the connectionist and the configurationist theories of learning, it is helpful to keep in mind the following comments by Jerome Bruner: "The psychology of learning has been only tangentially concerned, until very recently, with the optimal means of causing learning to occur. Very little of learning theory is given over to the designing of optimum orders of encounter for the learning of materials ..... How can material of a certain kind be so presented and so sequenced that it will be most readily and most transferably learned? .... The results of such research would provide a basis for a theory of instruction that is complementary to a theory of learning. Not until we have developed a theory of instruction will we be able to test propositions about the best way to teach something. Such a theory is required to "prove" ideas about curriculum. Without a theory of instruction, we are likely to accept uncritically some particular

description of learning as a prescription for optimal learning. A case in point is the idea that, in programmed instruction, "small steps and immediate reinforcement after each step" is the best practice. What is a small step? How should one choose a path up which the small steps lead? In short, what is the program of programmed learning? The evidence on optimum program sequences is virtually nil".(38)

The first large-scale field testing of programmed instruction in secondary schools was carried out in the Roanoke, Virginia, schools in 1960. No advantage of programmed instruction over more conventional teaching methods was shown. Lack of demonstrated superiority notwithstanding, Roanoke decided to include programmed materials in the regular curriculum for the following year. By 1962-63 programmes in foreign languages and other subjects were in use. The Roanoke Superintendent concluded from his school system's experience with programmed materials that Roanoke learned "the hard way" by not involving teachers far earlier in the adoption of new materials. He estimated that it took four months of the first year for teachers to feel at all confident about what they were doing. Thorough teacher orientation is essential. He also feels that teachers, and if possible, students, should take part in P.I. only of their own volition.(39)

Some conclusions that the school system of Denver, Colorado, has drawn from experience with programmed instruction are: "The skill of writing programs is apparently a slow acquisition, and the task of testing and revising programs is slow drudgery. But the task of selecting programs is also a slow one". (Fund for the Advancement of Education.(40)) To be certain of a programme, a school system should test it on its own students to be sure it is suitable for a given group. The school system should know as much as possible about the principles of programmed instruction. The process of selecting an appropriate programme takes longer than choosing a new textbook.

Although it is not considered feasible for a school system to make all or even most of its own programmes, commercial programmes are criticized for ignoring the principles of good teaching: variety, interesting writing, effective visuals, and a preliminary overview. There is evidence of programmers' weak backgrounds in the subject matter and blind faith in a stereotyped form of programming. Also there is a lack of research evidence that the programmes can really teach. There is agreement that the teacher's learning the principles of programming tends to improve teaching.

From the experience of using programmed materials in the Chicago area, mostly without machines, the following conclusions were drawn:

(a) Programmed materials (including appropriate tests) used by themselves, are not likely to satisfy either teachers or students.

(b) Programmed materials, used within a consistently "individualized" method of teaching, would enable students to move at their own rate; but there are formidable problems that will have to be solved before an appropriate teaching method for this objective can be described with any assurance.

(c) Programmed materials, enriched and reinforced by many other activities within the class - in other words, employed as aids like workbooks or films - can be used successfully by teachers.(41)

2. Instructional Television. To meet the challenge of rising pupil enrolments and teacher shortages, many educators have looked for help to instructional television. According to researchers Murphy and Gross of the Academy for Education Development Inc., "Whether measured by the numbers of students affected, or by the quality of the product, or by the advancement of learning, television teaching is still in a rudimentary stage of development. The medium can take credit for helping understaffed schools to cope with ever increasing enrolments. But television has not transformed education, nor has it significantly improved the learning of most students. In short, TV is still far from fulfilling its obvious promise. Television is in education all right, but it is still not of education ....

"Television works as an educational tool. There is no question of its validity as a medium of instruction. Students can learn from television, as they can learn from teachers and texts, radio, recordings, and films. But educators are still far from grasping the real nature and potential of television.

"Indeed there is evidence that undue concentration on the medium as such has limited television's usefulness. Television has usually been introduced into schools and classes without changing anything else, just as movies were used in the assembly programs of an earlier day. Few educators have used the new technology to help bring about a basic change in instruction, and there has been little relating of television to other new media and technologies.

"As a matter of fact, the most conspicuous result of television teaching has been an incidental byproduct: the medium has displayed in public what had heretofore gone on behind too many closed classroom doors - uninspired teaching. But the medium should not be blamed for magnifying the basic flaws in instructional procedures. As it has been used to date, television cannot upgrade the quality of American education; it can only alleviate the problems created by having too few teachers, too many students, and swelling curriculums".(42)

Instructional television (ITV) can be transmitted by a broadcast station or through a closed circuit. The advantages of closed circuit television can be observed from looking at the use of instructional television in Hagerstown, Maryland. The Hagerstown system can send out six lessons simultaneously over a coaxial cable linking 45 schools. In this manner several classes may be presented simultaneously and it is possible for a school to choose the programmes most appropriate for its students. The programmes are planned, produced and written by teachers from the regular teaching staff. The television teaching has been particularly helpful in meeting teacher shortages in the areas of elementary arithmetic, science, art and music.

In contrast to Hagerstown whose continued use of instructional television (since 1957) testifies to its successful adaptation for classroom use, an elaborate Midwest airborne broadcasting system has

failed as a device for classroom instruction. "This national technical system, contrary to original expectations, generally has not become a device for classroom instruction, but rather a telecasting system emphasizing popular culture, and aimed at the adult population. According to reports published in 1963, only 10 per cent of this telecast effort was directed toward classroom instruction. While the economic pressure on education may force a continued expansion of educational classroom telecasting, the results thus far indicate a failure of broadcast educational television to gain widespread acceptance in depth in educational institutions. Closed circuit television, much more successful as a college and university medium, has met the same resistance. Extensive availability does not mean extensive utilization". (43)

The more extensive use of instructional television in Maryland than in the Ohio Valley area is probably due to the fact that the teachers in Maryland had more choice in programme selection and were using programmes created by their fellow teachers.

"It is apparent that one factor conditioning the extent of use of televised classroom instruction is the flexibility of this medium, i.e. its adaptability in meeting varying classroom needs. Certain tendencies in patterns of decision-making and authority with regard to the creation and use of televised materials already are apparent and promise to diminish this flexibility. The general direction has been toward greater centralization and standardization. This trend is due not only to the inherent technological characteristics of the medium, but also to the manner in which television is being introduced into the schools. The production of television content is expensive and, in order to reduce per student costs, there is great pressure to produce for the widest possible audience for each program. In addition, television is being introduced from the top down by administrative decision, and is being developed by organizations operating outside the school system. The fact that these organizations are sponsored by tax-free foundations does not alter their highly centralized decision-making approach ...

"As educational television becomes developed, the content of mass education is determined increasingly by specialists who are concerned with techniques of mass dissemination of messages, rather than by professionals who are concerned with educational content. The division of labor and correspondingly of authority, shifts as new personnel are brought into the educational institutions in order to develop these media. One critic stated, or perhaps overstated, the case in the following terms: to get the kind of program he wants, the teacher must be prepared to struggle against men who call themselves experts". (44)

Murphy and Gross report that "about 7,500,000 in the elementary grades; a little over 2,000,000 in secondary school; and a little over 600,000 in colleges and universities; and 1,000,000 students of undetermined grade level are using ITV. In relation to actual school enrolment, the figures demonstrate that TV has made its educational mark predominantly in the lower grades. The use of ITV in the secondary school was not much higher proportionately than it was in higher education".

Murphy and Gross also report: "As to what was taught, how often, and for how long, the NITL survey produced a number of interesting findings. A large majority of all televised courses in the schools were beamed at the elementary grades, most of them to grades four and six. The closed-circuit systems surveyed placed much more emphasis on basic instruction than did schools using broadcast television. Of the programs distributed by ETV stations, about half could be classified as supplementary to the local school curriculum, about a third as basic instruction, and a sixth as enrichment.(45)

With respect to costs, a 1962 study by Henry R. Cassirer concluded: "Because of the wide variability in types of installation, it is difficult to give a cost estimate of operating a closed circuit television system. Few studies have been made and they are significant only in relation to the specific purposes served and the nature of the installation".(46) The Committee for Economic Development gives a cost estimate for a 100,000 student system model based on one hour of instruction per student per day through television. Costs vary depending on whether the programmes are locally produced as in Hagerstown, disseminated from a central broadcasting facility, or through the use of video tapes.(47)

Video tapes can take advantage of the best of open broadcast and closed circuit broadcasting. Particularly good open broadcast programmes can be rented and used at the teacher's convenience. Other advantages are: "Entire courses can be placed on tape and a teacher can be freed to work individually with students. Lectures can be given one rather than two to five times each semester. The machines can be used to analyze pupils' work in any of the performing arts - music, theatre, and dance. The image and sound can be recorded and played back almost instantaneously. A student of the violin might play a passage, then see and hear that passage replayed for him immediately. In physical education, immediate recording and playback makes possible correction and analysis. In public speaking, debate, and in fact in all communication, a recorded image can be made and played back for analysis and improvement. In the field of education a tape can be replayed numerous times to discover details concerning learning and instruction that might be lost with normal observational techniques".(48)

In addition to the expense of television for use in instruction another factor to be considered is to what extent the regular classroom teacher will be able to "follow up" the television lesson with her class. For instance, if lack of qualified language teachers prompts a school system to substitute a television teacher for a live instructor, it must be recognized that the television teacher alone cannot do an adequate job. Programmes in Philadelphia, Detroit and Los Angeles addressed themselves directly to the child but at the same time encouraged the classroom teachers to learn along with their pupils. Evaluation of the children's progress indicate that the effectiveness of the programme depended upon follow-up, continual practice, active interest and competence of the classroom teacher.(49)

Not only foreign language lessons need follow-up to be effective, but also science, art, and music lessons. If the television teacher is being used because the classroom teacher is not qualified to teach the subject, it is problematic how effective the necessary follow-through can be.

3. Computer-Assisted Instruction. A key question to be asked about any kind of educational technology is the following: is its cost so high that only large-scale adoption makes it economically feasible? If so, does that make necessary or probable large producing organisations with centralized control?

Organisations of national scale with centralized control in the field of educational technology would decrease the flexibility of schools in meeting individual needs. Schools would find that they had to gear their own activities to the schedules set by the controlling organisations and to their standardized items of interrelated "hardware" and "software".

As an example, Janowitz and Street contrast the foundations experiment in airborne educational television in the 1950's with the paperback revolution in schoolbooks. They have been quoted above on the subject of ETV. On the paperback revolution, they have this to say: " ... the mass textbooks and other printed materials are in interesting contrast to educational television because the result has been a contribution to individualization and use of a problem-solving format... the fundamental advantage of books is that they are not programmed even though some authors crudely try, so that books as media can arouse different interests and enthusiasms in different children.... Accessibility to books has been found repeatedly to be a crucial variable in the amount of reading; books now can be produced and distributed more cheaply....from a technological point of view, new printing processes could make possible greater standardization of text book content. Nevertheless, the degree of standardization has diminished... Large mass market paperback firms, which represented 57 per cent of all paperbound output in 1961, no longer produce the major percentage of paperback titles... in 1962 they claimed only 26 per cent of the total output. Thus, the impact of the new media...has had the result of producing new and varied titles...these books supplied the basis for the dramatic upgrading of both college and high school humanities and language courses...In 1962 paperbacks accounted for almost one-third of the books on art, business, education, sociology, economics, language, law, medicine, and philosophy...not only has decision-making over production been relatively decentralized but decisions over use also have been relatively decentralized. The teaching profession has been able to maintain and even increase control over the choice of printed materials, as they have not been able to do with television".(50)

Since Computer-Assisted Instruction (CAI) is extremely expensive, even with economies of scale taken into account, it is more likely to resemble the rigid pattern of instructional television than the flexible pattern of the paperback textbook field. Only extremely large firms aiming for a national mass market can afford to invest in the development of CAI. The Committee for Economic Development calculates that to provide one hour of CAI a day for every elementary and secondary pupil would at present cost $24 billion per annum, three-quarters of the total capital and current expenditures for elementary and secondary education in 1966-67. Without clarifying a great many considerations related to the kind of CAI contemplated, they conclude that computerized instruction is economically unfeasible for the present.

Economic considerations aside, it is worthwhile to consider some other aspects of the claims for CAI*. In considering the claim that it contributes to "individualization", one must consider two very different meanings of that term. One meaning Dr. Anthony Oettinger translates as "mass production to narrow specifications with rigid quality control". Under this definition the student "goes exactly where he is told to go" but at his own pace and with some variation in the routes by which different levels are arrived at, the variation being mainly in terms of different sorts of remediation depending on needs (branching programmes). A quite different definition of "individualization" has to do with the cultivation of individuality or creativity. The two are very nearly opposite, but in the literature the distinction between them becomes blurred.

In almost all of the experimental work done, it is the first definition which is implicit. One claim for CAI is that eventually it will be possible to make available to "millions of students" a very large number of programmes at any time they are wanted, assuming the student has access to a console hooked in to a large shared-time computer. However, there have been some computer simulations of situations where individualized instruction is implemented for a limited curriculum with a limited number of students and the simulations show that complete individualization very quickly runs up against the problem of excessive demands on scarce resources. When this happens, it becomes necessary to reinstitute some kind of group scheduling. That is, certain programmes are available to certain students only at certain times - or else the problem of programme availability gets out of control.

A study by the Systems Development Corporation included the simulation of an individualized ninth grade algebra course:

"The simulation was based on data that represented actual students in the operating school. The passage of the students through the course, receiving instruction individually and in small groups, being tested, getting help from the teacher and being referred to the counsellor, was simulated entirely on the machine. The results led to the conclusion that the school's procedure for grouping students was both inefficient and impractical. It appeared inefficient because of the time a student had to spend waiting for a group to form, and impractical because as students spread out over time the number of groups increased and the size of each group decreased. Demand for instructors soon exceeded their available time and students were spending too much time in non-productive waiting. These conclusions were subsequently verified in the school being simulated..."(51)

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*Here, I rely heavily on Professor Anthony G. Oettinger, of the Harvard/IBM program on Technology and Society. I quote from his "The Myths of Educational Technology", Saturday Review, May 18, 1968, 76-77; and with his kind permission, from his witty and illuminating book Run, Computer, Run, written with the assistance of Sema Marks. Harvard Studies on Technology and Society, Cambridge, Mass., Harvard University Press, 1969.

"The Brentwood system, as it currently stands, can store only a limited segment of the mathematics and reading programs at one time. Hence a new pupil cannot enter a group which has been working on the reading program for a year and begin from the beginning - that part of the course would have been removed to provide for later lessons. Of course, a past lesson can be re-introduced for this student if the operator has been notified in advance. Given the current conditions of computer operating systems, such jugglings are not necessarily trivial. In the future, scaling up to Suppes' 'millions of school children' will lead to the familiar difficulties.

"Similarly, if the achievement spread of students using the reading program at any one time were too great, it would very likely be impossible for anyone to use the arithmetic sequence".(52)

In general we know from several studies that achievement spread increases with age. Suppes has found "that when students are given the opportunity to progress at will 'the rate at which the brightest children advance may be five to ten times faster than that of the slowest children'. Although he began with a group of students 'very homogeneous in initial measures of ability' (IQ range from 122 to 167, with a mean of 137.5) after a year and a half the spread was 'almost two years'".(53) It is no wonder, then, that in one observed case of individualization the spread of individual variability became so inconvenient for the limited teaching staff that teachers began "limiting the output of the fastest students".(54)

In view of these findings the projected completely "individualized programs of instruction" for some high school complexes of 5,000 students are unrealistic - especially since the student body is intended to be heterogeneous both socially and ability-wise. The most such a high school is likely to do is substitute a more complex tracking system for the simple three-and-four-track systems now in use.

Another serious problem of individualization is monitoring student progress. It will be recalled that this was an unsolved problem during the first year at Old Bethpage. It is often claimed that the computer will relieve the teacher of the need to monitor the student's progress, just as various technological devices will take over the teacher's function of presenting materials. Monitoring by computer or by a programme is only possible if the precise skills to be mastered and levels of mastery to be tested can be programmed in.

"... the IPI (Individually Prescribed Instruction) effort in mathematics is 'a K-6 math curriculum with 800 criterion points'. ... e.g. on Level C-Numeration: 1. Read, write numerals 1-200. Sequence from any starting point ... Place Value: 1. Identifies place value of the units, 10's, 100's to 200. Indicates 'greater than' 'less than'. Addition ...3. Sums of 2 or 3 numbers, no carrying. (NEWS ABOUT CAI, May, 1967, Enteler, Inc.)

"The value of whatever success the Pittsburg (IPI) project may eventually achieve thus clearly depends on the value one attaches to the 'behaviorally defined objectives for each sub-area in the subjects involved,' in short, to the '800 criterion points'. This criterion of systems performance is crucial and should never be lost from sight among the technicalities ... In fact, so long as it is policy to strive toward uniform goals, allowing individual variations only in style,

speed or level of achievement, the success of individualization in the narrow sense described .. (above) .. seems more likely to reinforce the stamping out of idiosyncrasy in the school than to encourage individual variation in goals".(55)

Another problem with computers and similar educational machines is their incapacity to stand up under the kind of use children give them. A user reporting on students' work with a computer in a statistics course mentioned that the computer was very often in a non-functioning state - which was just as well, he said, since it gave an added touch of realism to the course. Many high school language laboratories have had to hedge the use of equipment with highly regimented rules. One such set of rules quoted by Oettinger warns "No one is an individual in the language laboratory"! This sort of thing arises from experience with students unwiring headsets; unscrewing screws; destroying tapes, etc. One wonders what a school system which tells teachers to keep textbooks out of pupils' reach except when they are actually in use for a lesson would feel about the prospect of expensive, delicate machinery in the hands of these same children. Such problems would be trivial except that they occur so universally and with such regularity. Teachers, who are often made responsible for keeping equipment in good condition, do so by stashing it in the closet.

A final point that Oettinger emphasizes should be mentioned. It is often said that educational technology will help solve the teacher shortage by making education capital-intensive rather than labour-intensive (though this is generally not said to audiences of educators). "There is merely no evidence for this," he states. P.I. requires highly skilled constructors of programmes, less skilled machine programmers, engineers, maintenance men, repair men, etc. Educational television requires the whole panoply of occupations connected with television: directors, producers, cameramen, prop men, sound men, lighting experts, film editors, etc. Very many of these occupations are higher paid than teaching, and in some of them, for instance computer programming, the shortage of manpower is serious. The difference in pay scales makes it unlikely that all these technicians would be "the servants of the teacher" as advertised. And if teachers themselves acquire any of these skills - such as programming - they may leave the classroom for greener valleys.

III. THE PROCESS OF INNOVATION

The process of educational innovation, a topic related to the sociological theory of complex organisations, has been the object of very little study, most of it recent. Researchers generally agree that the stimulus for educational innovation usually comes from outside educational institutions, rarely from within. Why should this be so? Gittell and Hollander whose study of Six Urban School Districts emphasizes the failure of the city school systems to change in response to a radical change in the composition of their clientele, attribute the failure to several factors. They emphasize that these systems are too large and overcentralized. The concentration of decision-making power among a small cadre of career officials and the fact that this cadre must make all the main decisions for such a huge system, makes the policy-making process glacially slow. In addition, they point out that most of the policy-making cadre in each system tend to be recruited from within it; that is, they are career bureaucrats who have made their way up to the top within that same system and have accumulated a large number of personal allegiances along the way. Their integration into a network of personal obligations makes it very difficult for them to innovate, since innovation would usually disturb groups and persons to whom they owe loyalty. School superintendents from outside are more innovative than superintendents chosen from within the system - but this is so only if they are provided with the means for recruiting an adequate staff loyal to themselves; if they are dependent on the staff work of long-time insiders, their efforts to innovate can be easily subverted.

These findings leave unanswered the question of why it is that recruitment of teachers and administrators is so inbred. Part of the answer for a city like New York is the fact that at some past time its own standards for teacher qualification were higher than those of the state. New York City teachers must pass a city examination in addition to meeting the state qualifications. It is doubtful that the city examinations still function in the way that they once did. Their main consequence today seems to be that those "in the know" with respect to the character of the examination - and these tend to be the graduates of a relatively small number of training institutions in and around the city - are the most likely to pass it, while able people from other parts of the country are eliminated by it.

Another reason there has been little innovation from within city school systems is that there has been no surplus of resources for innovation. The budget is almost completely accounted for each year by routine commitments, mainly to salaries, supplies, and plant maintenance and expansion, often at a less than adequate level. A school system which must house pupils in old, unsafe buildings, which can barely supply them with the minimum necessities in terms of textbooks, paper, and chalk, which has a severe shortage of teachers not to speak of specialists like testers and remedial reading staff - can hardly be expected to innovate. Even if an innovation promises to save money eventually, the process of instituting it is likely to be expensive.

Galbraith has written about the general tendency of the United States to affluence in the private sector and underspending in the public sector.(56) Before World War II, education was not regarded as an especially central institution. That has changed. Education is now seen as quite central to private interests in "upward mobility" and as a consequence there is more public willingness to invest in it. However, education still lacks lobbyists where it needs them - often in state legislatures. The concern in the 1910's and 1920's to divorce schools from the political party "spoils system" has led to a ritualistic avoidance of politics by educators which has become unreal and unconstructive. It has amounted in many cases to ceding influence to school boards made up of representatives of the business community whose chief concern is to keep down local taxation. It has meant that educators hesitate to bring pressure on state legislatures to allocate more money to education. In big cities, it is often the mayor who must be the main spokesman of the city's interests before the governor and state legislature; but a school system completely independent of mayoral control is not likely to find a strong spokesman in him.

Another reason often mentioned for the lack of innovativeness in school systems is the nature of their organisational structure. Although most professionals these days, including those in the old free professions, work within complex organisations, professional personnel function in special ways in those contexts. Although there is constant tension between the demands of professionalism and the organisational requirements of bureaucracies, doctors in hospitals, scientists in industrial research organisations and professors in large universities are able to maintain an autonomy in their work which is based on their expertise. They are able to participate in a system of sanctions dispensed by their peers, and to maintain a democratic collegiality in team work rather than a hierarchical command based on official status. Students of organisation agree that where authority is based on expertise rather than on hierarchical position - that is, where the type of structure arising from professionalism exists within the organisation, the organisation is more likely to be innovative than if it were bureaucratic. However, school systems typically have the bureaucratic type of structure rather than the professional, and this seems to extend to colleges of education.

A case study of itself, by the Center for the Study of Educational Administration at Oregon - one of the U.S.O.E. Research and Development centers - found that there was a deep cleavage in the patterns of communication and behaviour at the Center between the staff members who came from the field of education and those who came from the behavioural sciences. In general the people engaged in basic research were the behavioural scientists and those working in development and dissemination were educationists. The author divided the personnel, according to their patterns of communication, into Organisation Men and Research Men. He found several differences between them. (1) The Organisation Men regarded the Center as an end in itself; they felt it a duty to know everyone's name and rank. They used the Center's library, attended its seminars and read its internal memoranda with care. The Research Men regarded the Center as an instrument for getting research done. They were not especially concerned about knowing everyone's name and they were far less concerned with rank than the Organisation Men. They used the university library in preference to the Center library and they did not attend Center seminars so frequently nor read internal memoranda with such care. (2) Although the graduate assistants to the Researchers

tended to be young students while the graduate assistants to the Organisation Men were often men of mature years and many years' experience in educational administration, the Researchers treated their assistants more nearly as colleagues - asking their advice, for instance, whereas the Organisation Men treated their assistants as inferiors and never asked their advice. The assistants thus found the experience traumatic. Organisation Men spontaneously identified themselves and others in terms of their rank. Research Men spontaneously identified themselves and others in terms of "what they were working on". There was little communication across the boundary between education and the behavioural sciences; thus, functionally speaking, the Center was not very "interdisciplinary".(57)

This study is cited here to indicate that education is a quasi-professional field. Schools of graduate education apparently socialise their students for the behaviour appropriate to the bureaucratic systems in which they will function. The teacher, as a quasi-professional, is in a position filled with contradictions. On the one hand she leans heavily on supports and materials which in effect encroach heavily on her autonomy: curriculum guides, textbooks, "advice" from principals and supervisors. The effort to devise curricula and materials which will be "teacher-proof" is evidence of the view held by the authors of these curriculum materials that teachers are not to be trusted with professional judgements. Much in the teachers' own behaviour resembles that of the bureaucratic employee more than that of the professional. Teachers feel little obligation to keep up with any literature or to seek out new and better ways of performing their functions. Rather than searching for new practices they often feel that there is an admission of inadequacy in imitating the practices of another teacher. New teachers coming into the schools from colleges of education are criticized by the older, established teachers for any fresh new practices they try to introduce. Introducing new practices is regarded as "showing-off" and "rate-busting".

At the same time that the teacher does not, in many ways, behave as a professional - nor is she permitted to do so by the system - teachers think of themselves as professionals and use professionals as their reference group. Consequently they resist innovations introduced from outside as an encroachment of their "professional autonomy". Non-participation in decisions affecting them is deeply resented, especially if those decisions are made by "outsiders" rather than by their recognised superiors within the school system. The notion that "non-educators" can make competent decisions about schooling seems especially to fly in the face of claims that education is a profession. Thus teachers, principals and superintendents do not relish the control over educational decisions which is intermittently exercised by lay boards of education. This is bad enough when the lay boards consist of citizens whose own education equals, or surpasses, that of the educators. When there is a threat that decisions concerning their competence and concerning matters like curriculum, will be made by boards of laymen less educated than they, and of lower social status than their own, the situation so flagrantly denies any professional expertise to the educators as to become, from their point of view, intolerable. It is the fact that education has a weak knowledge base which makes threats of this kind from the laity possible.

Another cause often cited for the lack of innovations in school systems is the fact that they are monopolies. Since they face no competition, they need not be concerned with improvement of their services. In point of fact, the public schools are in competition with private and parochial schools, and they have lost to those schools many of their most academically able pupils. Still, the law guarantees them a clientele, however unwilling. A number of critics have proposed that competition between schools for this clientele should be introduced in some form. One proposal is that parents be given a state tuition allotment instead of being provided directly with educational service. Competing schools could then be organised and parents might freely patronise whichever they wished. Levin (58) has criticized this proposal on the obvious ground that it would lead to a still more unequal distribution of resources among schools than now exists. Better off families could add to their public allotment and pay for superior teachers and facilities, while those who were economically weakest would have to be content with what their public allowment could buy. The present form of public provision is at least somewhat redistributive. Levin and Sizer (59) propose to maintain this redistributive character of the situation by giving a public allotment only to the low-income segments of the population on a principle something like that of the negative income tax.* Other proposals simply suggest that there be a variety of types of public school organisation: schools run by the federal government (as on Indian reservations); by the states; by local communities; by private agencies under contract to the state; and so on. The idea is to introduce competitive diversity and thus encourage experimentation.(60)

A final reason why school systems are not innovative, especially in comparison to industry, is the well-known fact that the material parts of any culture are the most easily changed, while the core values change most slowly and with most difficulty. Schools are not merely instructional and classifying agencies. They socialise; that is, they train children in the core values of the society, supplementing the work of the family and church. Furthermore, the instructional aspects of schooling and the socialisation aspects, while analytically separable, are not separable in action. Every instructional process is also a process of socialisation. If instruction involves authoritative presentation of subject-matter by a teacher and its passive absorption by the pupil, it is at the same time a process of socialisation to authoritarian relationships with adults. If, on the other hand, a "discovery method" of instruction is used and pupils are encouraged to arrive at principles from their own observations and inferences, with limited guidance from the teacher, this is at the same time a process of socialisation to personal and intellectual autonomy. A very different kind of socialisation is going on if a teacher cannot admit he does not know something, because to do so would undermine his control over his students, and if admitting he does not know things and joining with his students in "finding out" is a routine occurrence.

Every conceivable innovation has some consequences over and above its instructional ones. Sometimes these are minor; but they may be very important and, if given no thought in advance, may arouse unanticipated

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* An experiment with "tuition vouchers" will begin in the United States in the autumn of 1970.

resistance. To take just a passing glance at an example, if the non-graded school really dispenses with the rough correspondence between level of expected accomplishment and age, which now pertains, the consequences could have many ramifications. Age not only has correlates in physical maturation; age-grading is a major basis of social structure. Each phase of the life cycle has its appropriate privileges, obligations and prestige. For children, age is an extremely important basis for awarding prerogatives and demanding increasing responsibility in return. Children in school feel extreme shame at being classed with those very much younger than themselves. The importance of being a "fourth grader" is great enough to motivate sincere striving toward the expected behaviour - as opposed to "third grade" behaviour. What would happen to these powerful levers of social control if age and levels of academic achievement were to become completely unhinged?

Not only is there resistance to innovation in school systems - there is also the phenomenon of over-diffusion. Because of their limited resources, schools are vulnerable to contingent handouts. If "innovation" is the price of getting federal money, they will seek frantically for something to do which can be labelled innovation. If the word from Washington is "community participation", there will be something called by that name and resembling it sufficiently to get the money. If huge sums are made available to test the feasibility of computer-assisted instruction, some school systems will contract to test its feasibility - often to gain political credit for being "innovative". It would be better all round if federal aid to education and the subsidization of innovation were kept separate and called by their right names.

IV. THE NEED FOR EDUCATIONAL RESEARCH AND RESEARCHERS

This section relies heavily on two papers by Sam Sieber (61)(62) who, together with Paul Lazarsfeld(63) has written the best recent surveys and analyses of the organisation of educational research in the United States.

The infusion of federal funds which has sparked so much other educational activity since the mid-fifties has also given rise to new organisations devoted in part to educational research. Many of them devote a large part of their activity to development without accompanying research, however, and a good part of what is called "research" would not be labelled either basic or applied research in any of the natural or behavioural sciences. By this is meant, for example, that "evaluation research" in the field of education traditionally refers to the observation of a project or a school system by an expert consultant who then writes an informed, qualitative assessment. Such evaluations are extremely useful, but they do not coincide with what is understood in the behavioural sciences as "evaluation research". Much more that is labelled "research" in some organisations is social book-keeping: the collection of basic statistics concerning enrolments, staff sizes, school retention rates, costs, teacher/pupil ratios and so on. Again it is conventional in the field of education to label such important and necessary book-keeping activities as "research" but this differs from the conventional use of the term in the liberal arts and sciences.

There are four major kinds of organisations engaged in educational research (leaving aside the R and D activities of private industry related to educational technology). First, there are university-based research units. In 1964 Sieber and Lazarsfeld found 70 of these based in graduate schools of education (of which there were then 110), a quarter of them having been founded since 1960. Only about a third of these units were exclusively concerned with research; two-thirds gave more than half their budgets to research, while the remainder gave more than half to services. "Typically, personnel associated with these units prepare unsolicited proposals for submission to foundations, the university or the federal government, the latter being the major source of research support in the country. Overall the areas that are most commonly researched are: tests and measurements, methods of instruction, educational administration, reading, and psychology of learning". Most of the staff are faculty members devoting part-time to research, and graduate research assistants. About a quarter of the professional personnel have been recruited from behavioural science departments outside the school of education.

Another type of university-based research organisation working in the field of education is that found in behavioural science departments, especially sociology, psychology and social psychology, which devote part of their programmes to educational research. The Bureau of Applied Social Research at Columbia University, attached to the Department of Sociology, is an example. B.A.S.R., founded by Paul F. Lazarsfeld, is

famous for its contributions to the American tradition of empirical sociological research. In recent years at B.A.S.R. there have been many projects in the sociology of education. While only a portion of the Bureau's large programme is related to education, all of what it does is basic or applied research in the "hard-nosed" behavioural science tradition.

Another university-based group are the ten Research and Development (R and D) Centers, supported mainly by federal funds under E.S.E.A. The funds for each center average about $1 million annually. Each one focusses on a special educational problem such as cognitive learning, teacher education, individualisation of instruction, higher education, or educational administration. The centers are supposed to invent new educational practices as a result of on-going research, test them in the field, and disseminate them. Only a portion of their activities is devoted to research. Development and dissemination are a major part of their mandate.

Still another group of organisations with federal support on about the same scale (but with other sources of support as well) are the inter-university consortiums which make up the Regional Educational Laboratories. There are twenty of these. They are committed to translating educational research findings into practice in local schools within a designated region.

The second type of unit is research organisations based in State Departments of Education. Most of the activity in these units constitute research services, such as consultation on proposals for federal funds being prepared by local school systems, summaries of research on various topics, screening of proposals from outsiders who want access to the schools, and routine statistical services. Another major part of the activity is the state's educational book-keeping. In a few states another activity is evaluation, usually not based on systematic, empirical research but on the evaluative impressions of experts.

A third type of unit is based in local school systems. When these are in big cities, the research unit may be larger than that of the state department of education. Most of the work is of the same nature.

Fourth are private, independent research organisations. Among these are the well-known testing organisations, like the Educational Testing Service, organisations sponsored by professional associations like the Office of Research of the American Council on Education, and research done by scholarship agencies such as the National Merit Scholarship Corporation. The testing organisations include a heavy representation of non-education personnel, largely recruited from psychology and statistics.

In a 1967 interview, R. Louis Bright, then head of research at U.S.O.E., said that the regional laboratories funded by U.S.O.E. were doing "practically no research. There is no fundamental research", and that the R and D Centers were spending 30 per cent to 40 per cent of their time on basic research and the rest on applied research.(64)

Education is not the only or first field to suffer from the federal government's short-sighted emphasis on funding "applied" as opposed to basic research. It has also been federal policy in the health fields to a greater extent than scientists like. The exhortations to the field of education to emulate industry's policy of investment in R and D are misplaced. Industrial R and D has the whole wealth of basic natural science theory to draw on, while education has no similar wealth of either natural or social science theory as an underpinning for "development" studies. That is why so much that passes for "development" and "innovation" is mere fashion. There is too much emphasis, not only on development, but on dissemination where there is nothing well-tested and worthwhile to disseminate.

No doubt part of the reason for the present situation is that educational research, traditionally, has been so unproductive that it is no longer looked to for results. "Consensus on the failure of educational research to improve school practices is so widespread that the point needs no substantiation here. For example, in a recent survey 90 per cent of the deans of education in the nation denied that we already know so much about the teaching-learning process that the main problem is dissemination of knowledge". (65)

The Sieber and Lazarsfeld study provides both an explanation for this lack of productivity and a warning that a radical change is needed in the current occupational structure of the educational research field - a change which U.S.O.E. policies have thus far not promoted.

The problems of educational research have stemmed from the historical isolation of education faculties from the liberal arts and sciences even when they were on the same campuses: from chronic shortages of personnel, from pressures by schools for services, which have drained the schools of education of energies and resources which should have gone into research, and from the relatively poor quality of graduate students in education.

"The founders of educational research were not trained in professional education for the simple reason that graduate schools of education did not exist when these men received their training. But when schools of education were created, the founding fathers quite naturally moved into these new institutions. Their students had less background in non-educational fields, and the students of these students were even more provincial, and so the cycle of in-breeding and provincialization continued. Later generations therefore became increasingly isolated from the main streams of scholarship in the academic departments of the universities.

"One terrible consequence of this isolation has been a neglect of theoretical frameworks for the guidance of research...many educational researchers are content to collect random facts about schools, to spend their professional careers evaluating trivial educational inventions, or to compare program A with program B in a single school ... Another dismal consequence of this isolation... has been preoccupation with psychological research on education, particularly the 'test and measurement' approach to assessment ... all of the eminent men who launched the field of educational research forty to fifty years ago were themselves psychologists ... the other social sciences were academically immature in those days... but the in-breeding ... prevented the faculty

from keeping abreast of developments in political science, sociology, history, and economics over the past forty years ... A survey was carried out in 1964 among all the authors of research articles on education that appeared in some forty journals. Only 4 per cent of the authors were social scientists other than psychologists. And among the projects supported by the Co-operative Research Program of the U.S.O.E. from 1956 to 1963, only 10 per cent were conducted by social scientists other than psychologists. What this means is that dozens of research topics are awaiting the attention of behavioral scientists". (66)

Sieber goes on to point out that schools of education have been less successful than other professional disciplines in insulating themselves from demands for routine service work by schools. "It should not be the obligation of any institution of higher learning to give routine help to schools, anymore than it should be the responsibility of a medical school to take care of patients,... or of a department of sociology to conduct the census, unless these activities are conducted solely for training purposes.

"In short, a resurgence of interest in developmental and disseminative activities which is not linked to new and improved research ... (will mean) a myriad of educational fads whose sole value will be political ... this is precisely the direction in which the academic community is being pushed even farther by recent U.S.O.E. outlays for development and dissemination combined with holding the line on research funds".(67)

The conglomeration of non-research and quasi-research roles in education, produced by accidents of history is accepted today as the demand structure dictating the future supply of educational research manpower. It is difficult to develop educational researchers within schools of education because more immediately pressing practical demands divert them. Only 5 per cent of those who enter graduate schools of education complete degrees. This is connected with the fact that graduate work is usually postponed until after some practical experience in teaching has been obtained, and most of it is entered into to get "credits" toward advancement and higher salaries for which degrees are not always required. Professors of education are loaded down with teaching and supervisory responsibilities so that their research, if any, is necessarily spasmodic and fragmentary. "... out of all persons conducting research oriented toward the concerns of professional education, only 3 per cent are full-time researchers. Half devote less than 21 per cent of their time to research". And finally, schools of education as shown by various measures of the qualifications of students entering them, have attracted the less able graduate students in the university.

"The implications for policy are four: (1) More researchers from the behavioral sciences need to be recruited and trained for work on education, and particularly for work that strives for theoretical cogency and breadth ... almost all of the Research Training programs supported by the U.S.O.E. are located in schools of education. In other words, the traditional structures are still training the next generation of researchers ... In the meantime the R and D Centers and Regional Laboratories will have to continue recruiting from schools of education, despite their already desperate search for non-education-trained people.

"If we wait much longer, people with educational backgrounds will gain positions of authority in these new structures, and the in-breeding of educationists will simply be transferred from the old to the new institutions at public expense.

"(2) The current hysteria for 'development' and 'dissemination' should not be permitted to drain off the available manpower for research.

"Although systematic research is by no means the only avenue to good educational ideas, a larger pool of researchers is needed to evaluate even those brilliant ideas that are not derived from research .. the Research and Development Centers ... should not be rushed into the production of teaching materials, but should be permitted to demonstrate the value of sustained inquiry. And finally, a balance between research and development funds should be carefully preserved in the programs of the U.S.O.E. (As a result of recent congressional appropriations this balance has been badly upset, with far greater weight being allotted to action programs in schools; and the greatest casualty of all was the Research Training Program, which was actually cut back after only one year of operation.)

"(3) ... research talent needs to be identified and encouraged at an early stage so that students will go on for the doctorate without interruption, and then continue into research jobs; and the best researchers need to be released from traditional teaching obligations so that they can conduct special research training programs and supervise students' research.

"(4) The relatively poor quality of graduate students in education means that sufficient funds have to be offered to attract the better students in other departments particularly in view of the competition with other fellowship programs in the behavioral sciences; and that standards for entrance to advanced degree programs in education need to be raised".(68)

V. INNOVATION: SOUND AND FURY?

Much of United States education is improving rapidly, but the educational aspirations of nearly every group in the population are rising faster still. Many of the troubles our schools face have their roots in larger social problems, but they are played out on campuses because that is where such a large portion of the society conducts its daily affairs.

The best of our elementary and secondary schools are the finest the nation has ever had. The same is true of our best colleges and universities. Some central city school systems have declined from earlier peaks of excellence, but even in decline they are better than the legally segregated Negro schools of the old South which, for much of their clientele, they historically replace. To be convinced of this, one need only look at the national comparison of school facilities available to Negroes and whites as set forth in the Coleman report and then at the comparison of Negro and white Southern segregated school facilities in the report of President Truman's Civil Rights Committee, To Secure These Rights (1948).

So long as the bulk of American Negroes made their living from Southern agriculture, the gross inferiority of their segregated schools was barely perceived as a problem by whites. Today the destructive effects of that long history of inadequate schooling must be made good. Until it is, blacks cannot join the mainstream of American society. The task of educational innovation lies in extending more nearly equal educational opportunity to disadvantaged minorities, lagging regions, low-income groups and crisis-ridden cities. Innovation without the political will and a large investment of resources will be useless; but innovation is needed.

Have the innovations described in this monograph much to offer? It is hard to say because most of them have neither developed out of basic research nor received competent evaluation.

There are several strands of basic research which hold promise for solving the central problems. One of these suggests that a key organisational strategy for upgrading disadvantaged pupils is social class desegregation. Research studies have repeatedly found that youngsters from educationally weak homes benefit by attending school with classmates who have well-educated parents. Racial desegregation appears to be beneficial not because of anything to do with race but because it puts disadvantaged black pupils into contact with educationally advantaged whites. It would be equally beneficial for them to go to school with black youngsters who had well-educated parents.

Unfortunately, the separation of the social classes into cities versus suburbs is probably increasing the social class segregation of American schools. The sharp residential segregation of the social classes is disastrous, and not only for schooling. A few suburbs in

the greater Boston area which have incorporated small numbers of black students into their schools through bussing are now promoting low income housing within their boundaries. Housing policies which promote heterogeneous neighbourhoods are vital for education.

Another body of important basic research is the study of learning in early childhood. Psychologists are making new discoveries about learning in infancy. The more they learn, the earlier the middle class child's advantages seem to begin. Recent research is beginning to specify what those very early advantages are. The more precisely this is known, the more obvious it will become what kinds of "compensation" will work best for children who are presently deprived of the foundations for effective academic learning.

A third line of basic research potentially of practical importance is the sociological study of complex organisations. Everyone senses that bureaucratic structure, functional for some kinds of industrial and governmental administration, is dysfunctional for teaching and learning. Sociologists of education are beginning to specify why this is the case: how the teacher's role becomes replete with strain; how the selection functions of the school interfere with education; how the bureaucratic structure of the school system inhibits innovation. They are also studying the organisational conditions under which teams of scientists and other professionals are most productive. This research has obvious relevance for educational innovation.

It is because the innovations now popular are not grounded in any well-tested theory that they present so unpromising a picture. Head Start, for instance, seems to be ineffectual academically. This is due not only to the fact that the programme is too brief and diffuse but also to the fact that we do not yet have a fully adequate theory of early childhood learning. Similarly, to recall Bruner's formulation, there exists no theory of instruction, which might provide a programme for programmed instruction. Or again, while it is obvious that non-grading, team teaching, and flexible scheduling portend a radical change in schools as organisations, there appear to be few attempts to look at the consequences for learning of these innovations viewed as changes in the context of social relationships in which learning occurs.

Evaluation research of a high quality is also much needed. Title I and Title III of E.S.E.A. require grantees to evaluate their own projects. Not surprisingly, this has resulted in a flood of favourable reports which, however, are contradicted by such objective evaluation as we have. The disinterested evaluation researcher is nearly always an unhappy man caught in a political crossfire of vested interests which attack his motives and his methods. As a result, researchers tend to stay clear of this kind of work. The difficulty lies in the structure of educational R and D which permits groups to develop heavy stakes in the apparent success of large-scale innovations that were never adequately tested on a pilot basis. Evaluation research has also been unduly narrow - testing only whether certain outcomes were achieved but leaving unexplored the question of what elements in a complex innovation are causally linked with outcomes.(69)

In the long run, no particular innovation is as important as the institutionalization of innovativeness. The question is how to do it. Part of the answer is more resources. Another part is a greater professionalization of education. However, education can become fully professional only if it is based on a genuine expertise which in turn rests on a solid body of educational theory. Innovativeness can be institutionalized only if basic and applied research of high quality are institutionalized. As Sieber and Lazarsfeld have pointed out, appropriately trained manpower in sufficient numbers does not exist, nor are schools of education presently suited to produce it. Ways must be found to attract researchers in the natural and behavioural sciences to educational problems and to support their training and their work. This manpower problem needs serious attention.

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